CHAPTER 6 FLOOD PREPAREDNESS PLAN

6.1 General Concept of Flood Preparedness Plan

6.1.1 Principle of Community-based Disaster Management

In order to mitigate flood and debris flow disaster, structural measures as engineering intervention has been generally planned. However, there may be always limitation of such mitigating measures for overwhelming level of hazards. To mitigate only by structural measures is unrealistic in respect to cost and duration of construction.

To prepare for such overwhelming disasters that mitigation measures cannot completely prevent, it is necessary to establish risk management system under which villagers and passengers can access to appropriate information about floods and debris flows and immediately evacuate in coordination with the concerned public authorities.

The mitigation measures of structures and such community resilience are the two major components of the holistic disaster risk management, and they are complimentary to each other for establishing safer community. For this reason, establishment of village-based risk management system, which is autonomously conducted by villagers are essential.

Actors at each level, such as public officials, village community, and individuals are all responsible for disaster risk management. Actions by public sector, community, individuals are called public help, mutual help, and self-help. Public sectors give support the activities of village community and individuals. Village community and individuals cooperate with public officials. Through these activities, capacity of disaster management can be enhanced.

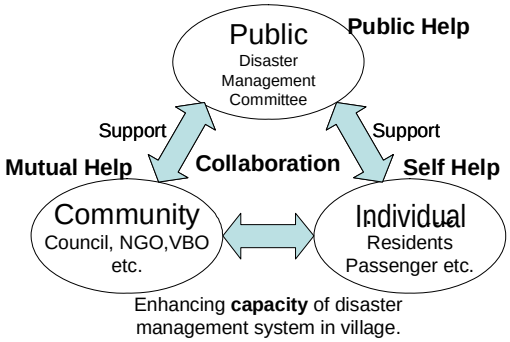


Fig. 6.1 Collaboration among Public, Community, and Private

6.1.2 Goal and Target Group

The goal of the disaster risk management is to stop human loss and to reduce property damages. Target groups are villagers of hazardous areas in the Madarsoo River basin. In the basin, population ratio of less than 15 years old is approximately one third and majority of victims in the past disasters are children. For this reason, school children are focal target along with villagers.

6.1.3 Strategy

Encourage Self-help

To establish village-based risk management system, it is important for villagers and tourists to understand the basic concept that each individual has to have self-help attitude that their lives should be protected by themselves. It is also important that everyone has to have proper knowledge about disaster risk management, identify the risk judging from information of mass media such as TV and radio, and decide evacuation actions accordingly. Such

information and evacuation system need to be established. There is an indigenous way of communication within the village, and therefore such system needs to be enhanced for development.

Enhance mutual Help and Cooperation Network

To establish such system, it is important to develop the system not only by self-help endeavor but also by mutual help, in cooperation with local communities, such as village council, non-governmental organizations, village-based organizations, and local public authorities. The role of the public authorities is to give necessary support to the village community. Major role of the public authorities is to establish systems of proper information distribution and evacuation order within public authorities and to village council. Disaster risk management is not enough just at village level so that it is necessary to have joint efforts, among villagers, local communities, and public authorities. It is also effective to go through participatory planning process.

Step-by-Step Approach

It is time taking process to establish this system in the communities. Thus things that can easily be accomplished may conduct first as step-by-step approach. Following the approach, pilot activities in the course of JICA study are shown in 6.3, and framework of village disaster risk management is proposed in 6.4 in this Chapter.

6.2 Hazard Map Preparation

6.2.1 Processes of Hazard Map Generation

Hazard Map

People, who live in or travel to the Madarsoo River basin, should know what kind of and how serious natural disasters happened in the basin in the past. Usually, people forget or keep little their memory on the past disasters. Especially to the children, they do not know on the disasters. Therefore, JICA team prepared the hazard map for keeping or recalling the past disasters in people's mind. In the long run, people could learn how to protect against the future disaster utilizing the hazard map.

Simulation of Past Flood

In the Madarsoo River the large-scale disastrous flood occurred successively in 2001, 2002 and 2005. To utilize meteo-hydrological data observed in these floods, JICA team conducted model construction and parameter identification. Based on the results, flooding simulation was made using 100-year flood. The result of the flooding simulation shows in Fig. 6.2 as flood extent over the riparian areas.

Fig. 6.2 Simulation Result of 100-Year Flood in the Madarsoo River

Engineering Field Adjustment

With the simulation result, JICA team implemented the field survey to check the accuracy of flood extent and to make engineering adjustment of the extent along the river course. This work was done village by village. Finally, the extent of flood zone was adjusted.

Fig. 6.3 Engineering Field Adjustment in Gharavol Haji Tajy village

Hazard Map Generation

To overlay the flood extent, topographic data and satellite images in GIS software, JICA team generated the hazard map as shown in the followings.

6.2.2 Hazard Map Description

The Madarsoo River could be categorized into four parts from geomorphologic features.

- Gorgan Plain: Downstream of Kalaleh Bridge,
- Valley-bottom Plain: From Kalaleh Bridge to Tangrah village,
- Mountain Gorge: From Tangrah village to Dasht Bridge, and
- Dasht basin: Upstream of Dasht Bridge

Topographic conditions are already described in Chapter 2 for each area. From the viewpoints of hazard map preparation, the characteristics of each part are briefly described below.

Gorgan Plain

Through the hazard map, the villages can be found to be located in the Gorgan Plain, which is flood-free area from the Madarsoo floodwater, since the Madarsoo runs forming lower terraces with about 10 m lower than the plain. People who live in the area during flood time should only keep one thing in mind; “do not come nearby the river course for a curiosity looking”, because the flood sometimes rushes the riverbank and make it collapse. To keep away from river is an important rule for flood preparedness against flood disaster.

Fig. 6.4 Hazard Map in 100-Year Flood between Golestan Dam and Kalaleh Bridge

Valley-bottom Plain

The valley-bottom plain extends from Kalaleh Bridge to Tangrah village. Usually, the river did not form clear natural levee, and the floodwater easily overflows along the river course. People are living near to the water, and it is the hazardous area to be flooded. Besides the debris flow occurred in some mountain streams in the 2001 Flood.

To refer to the hazard map, the villages of Gharavol Haji Tajy and Ghoghor Shirmelly are all inside of the flooding area. However it was verified that the floodwater velocity was not so fast and the water level increased slowly in the 2001 Flood, through interview survey. Therefore people should not be in panic in the flood time. “Keep calm and stay at home until floodwater subsiding, or evacuate to the higher place” is the key for this area. In the flood time people should also keep away from the river course.

Ejen Ghareh Khoojeh village has two parts. The northern part of the village is on the top of hills, and it is the safer area. On the other hand the southern part is located in the flooding zone and is near to the river, so that people living in this area should escape to northern part immediately when flooding occur.

Ghanjagh Shahrak village is located in wide flooding zone. But the floodwater velocity and the water level increment are slow. In this area, people should move fast if they evacuate to Darabad village by truck, or they should stay at home until floodwater subsides.

From Agh Ghamish to Tangrah village, the floodwater velocity is fast so that people should keep far away from the river. People should use much more caution to the debris flow from the mountain streams.

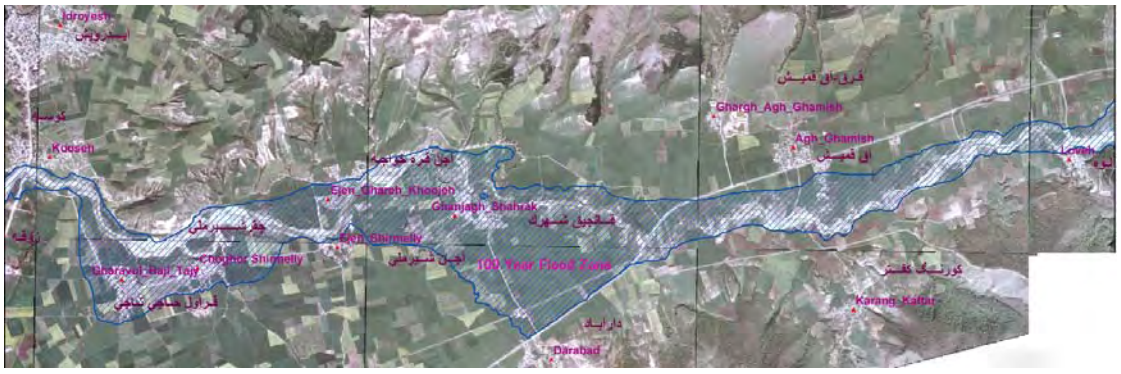


Fig. 6.5 Hazard Map in 100-Year Flood between Kalaleh Bridge and Loveh Village

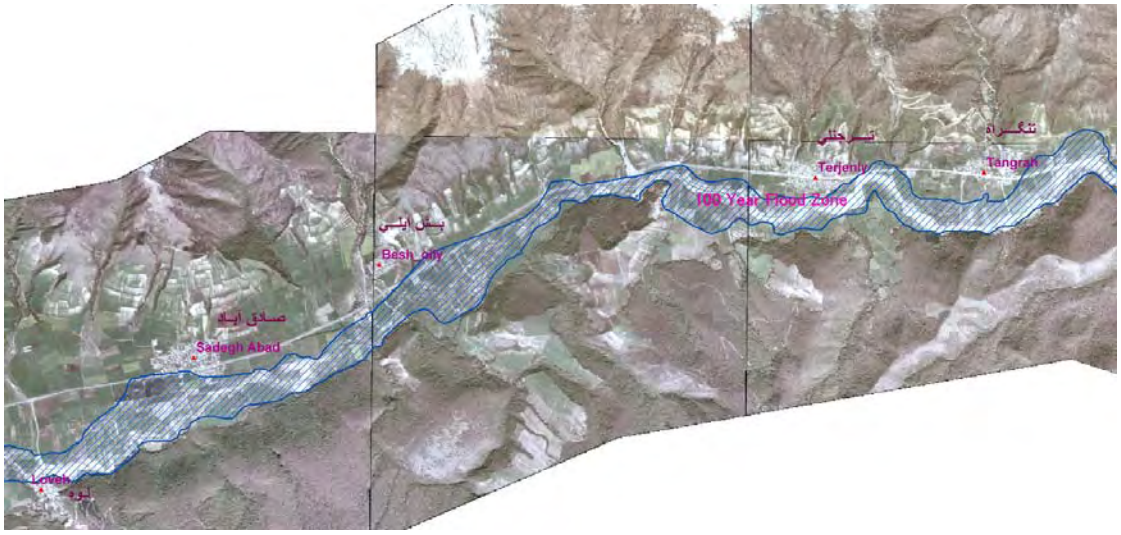


Fig. 6.6 Hazard Map in 100-Year Flood between Loveh and Tangrah Villages

Mountain Gorge

From Tangrah village to Dasht Bridge, the Madarsoo runs through mountain gorge of the Golestan Forest National Park. There are no resident inside the park, but there are many campers and visitors in summer season.

The floodwater rushes down very fast in the flood time due to the narrow gorge and steep riverbed slope. It is only way to force the people into going out of the park before flood comes. Thus establishment of early flood forecasting and warning system is indispensable to save the visitors in the park from the floods.

Dasht Basin

Agricultural land widely extends in the Dasht basin, and Dasht village is located in the downstream end of the basin. The three river systems join together near Dasht village, namely Gelman Darreh, Dasht-e-Sheikh and Ghyz Ghaleh rivers. Thus the village is situated in the center of flood-prone area.

6.2.3 Evacuation Route

Based on above considerations, the residents in Terjenly, Tangrah and Dasht villages should take refuge from both flood and debris flow when an evacuation order is announced. JICA team prepared the evacuation route maps for these three areas by using GIS tools.

Terjenly Village

Terjenly village is developed on the alluvial fan, which is flood- and debris-prone area from its origin. Two mountain streams divide the village into three parts. In torrential downpour, the residents shall take evacuation route of the green arrow toward the yellow zones in accordance with divided three locations as indicated in Fig. 6.7. Yellow areas are higher terraces so that the areas can be regarded as flood-free zones.

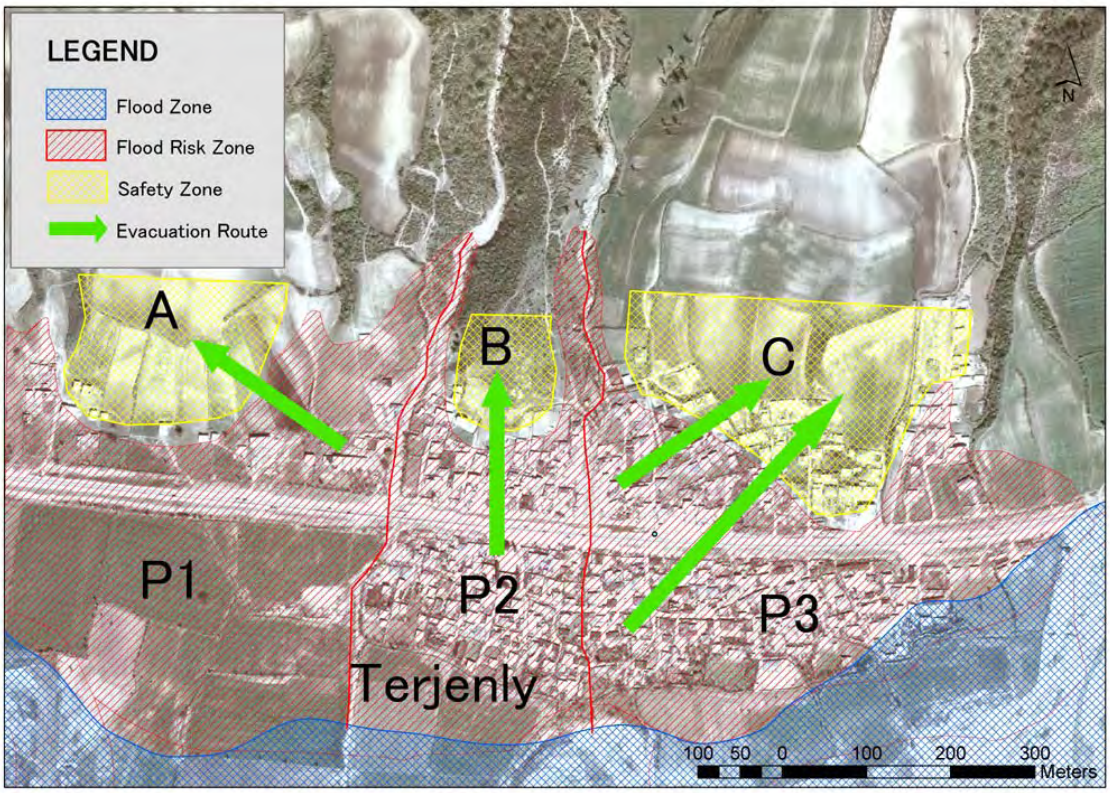


Fig. 6.7 Evacuation Route of Terjenly Village

Tangrah Village

Tangrah village is also developed on the alluvial fan. Tangrah River divides the village into two parts. In torrential downpour, the residents shall take evacuation route of the green arrow toward the yellow zones in accordance with divided two locations as indicated in Fig. 6.8. Yellow areas are higher terraces so that the areas can be regarded as flood-free zones.

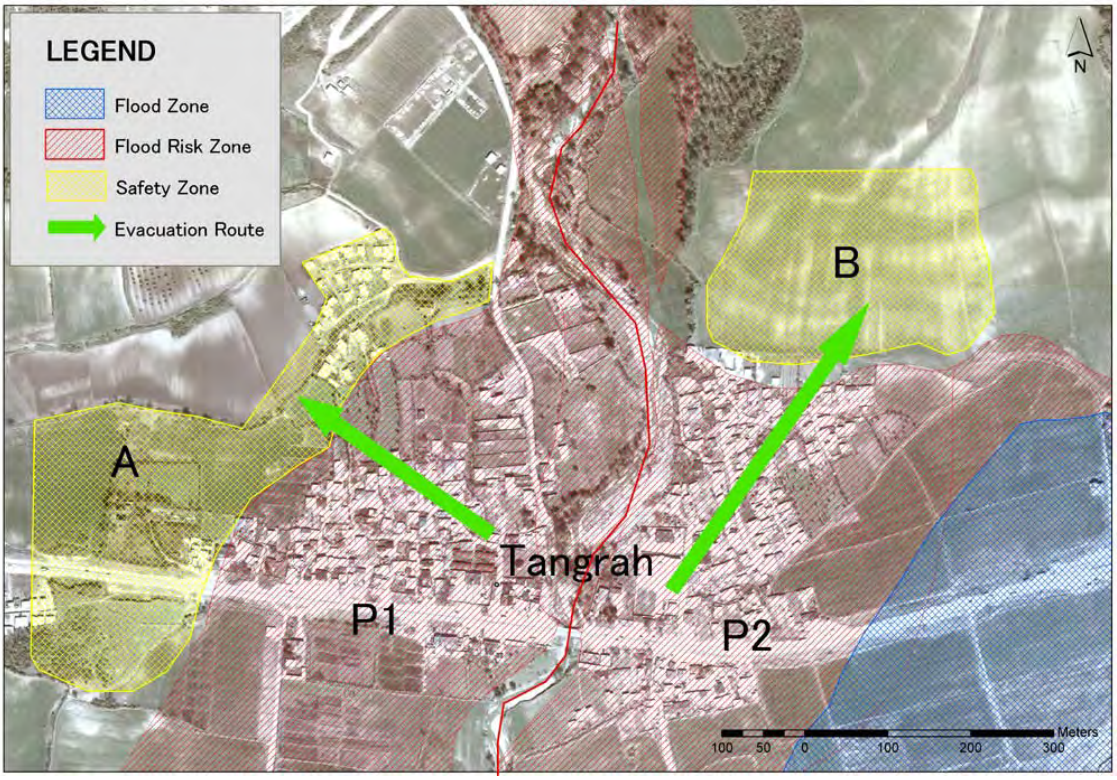


Fig. 6.8 Evacuation Route of Tangrah Village

Dasht Village

Dasht village is located in the downstream part of the Dasht basin. There are three floodwater and sediment runoff sources around the village as mentioned before. After the 2001 Flood, the polder diking system was constructed and protected the village from the floods of the said three river systems as illustrated in Fig. 6.9.

There is a hill southwest of the village, and the polder diking system anchors to the hill. It could be used as evacuation place. The evacuation rule for Dasht village may be enumerated below.

(1) In the flood time, people should evacuate to the mosque that is located in village center, or stay in their own houses. At the same time some young and strong villagers shall be dispatched to two flood-watch sites on the top of polder dike to keep watching floodwater of three streams.

(2) If floodwater of the Gelman Darreh increases and village starts to be inundated with floodwater, people should follow the green direction to evacuate to the safety zone. The direction of evacuation route is toward higher and farther place from the Gelman Darreh River course, and the route on the dike is protected by the hill against the Ghyz Ghaleh flood.

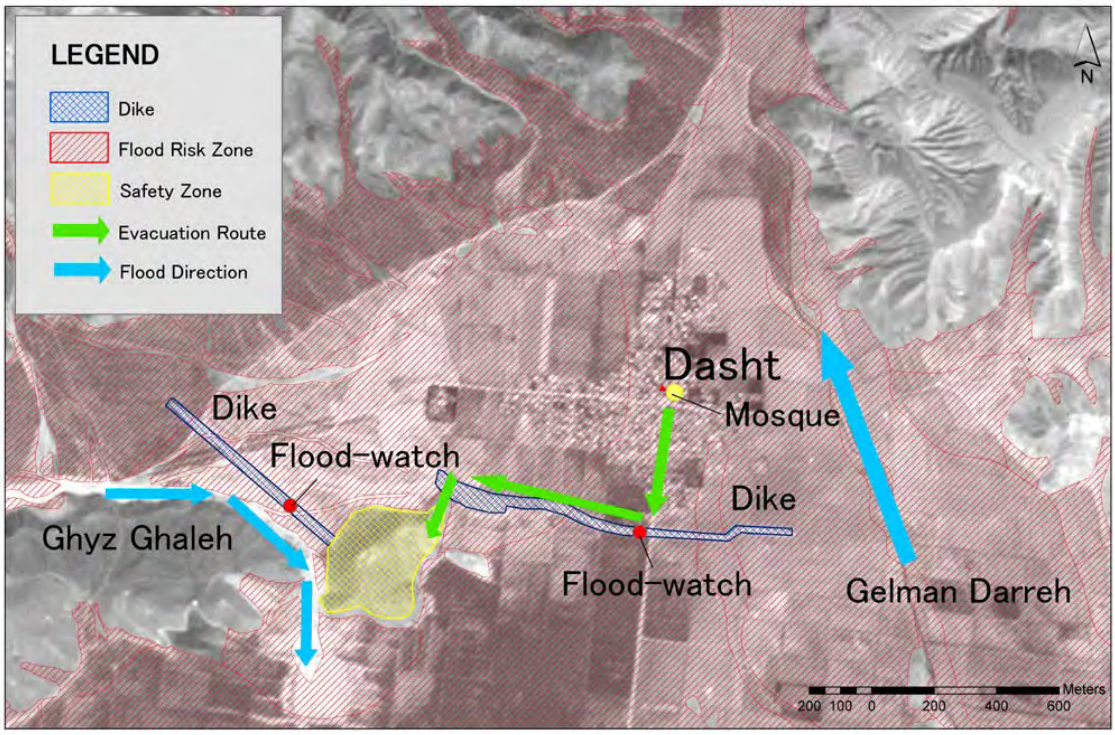


Fig. 6.9 Evacuation Route of Dasht Village

6.3 Pilot Activities

6.3.1 Aim

Pilot activities are conducted to examine the plan of village disaster risk management activities on site and get feedback and revise the original plan. This plan aimed to be served as a template for other vulnerable villages. The following figure shows the risk management steps and village activities are planned according to the steps. Planned activities are categorized in table below.

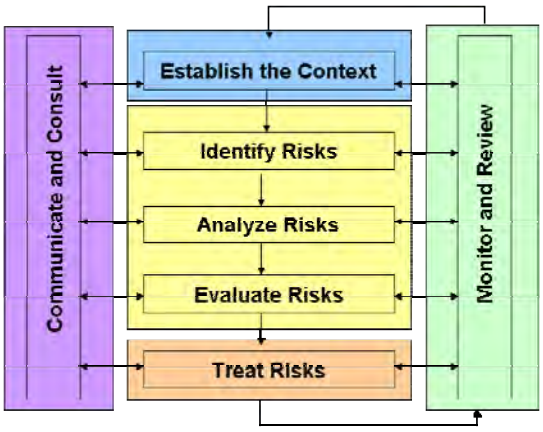


Fig. 6.10 Disaster Risk Management Steps

Table 6.1 Stage-wise Activity

Stage	Activity
Establish the Context	Discussion with public officials, Strategic Meeting w/ Village Council
Identify, Analyze, Evaluate Risk	Social Survey, Risk and Resource Mapping
Treat Risk	Village Based Disaster Risk Management Planning
Communicate & Consult	Advisory Committee, Forum, Educational Materials
Monitoring & Review	Drill, Map Maneuver

6.3.2 Formation

Dasht and Terjenly villages were selected as pilot activity sites. Pilot villages serve as demonstration sites of activities which are observed by other vulnerable village councils. Advisory committee was held among related public organizations and Red Crescent Society

to share the experiences in the pilot villages, lessons learned, to review master plan and action plans of village disaster risk management. The JICA team has assisted to such activities.

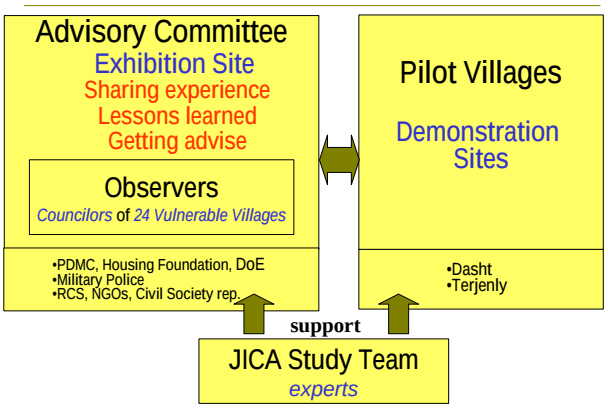


Fig. 6.11 Formation of Implementing Pilot Activities

6.3.3 Sequence of Activities

Model activities are summarized in Fig. 6.12.

6.3.4 Schedule

Vulnerability and capacity assessment was conducted from January 2005 to May 2005 in 33 vulnerable villages along the Madarsoo River basin. In August to September 2005, based on the assessment results, two pilot villages were selected and preliminary activities of Village Watching and Mapping has been conducted. In February to March 2006, workshops were conducted every week at each village. The schedule is shown in the following table.

Table 6.2 Schedule of Village Activities

Activity	Jan 29–Feb 3	Feb 4–10	Feb 11–17	Feb 18–24	Feb 25–Mar 5
Consensus building with Public officials	▬				
Strategic Meeting with Council		▲▲			
Mapping			▲▲		
Village Plan				▲▲	
Educational Materials for villagers and Passengers	▬	▬	▬		
Writing Scenario for Drill				▲▲	
Drill and Critic					▲▲
Documentation of village DM activities	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	■ ■ ■ ■	▬
Advisory Committee for review					▲

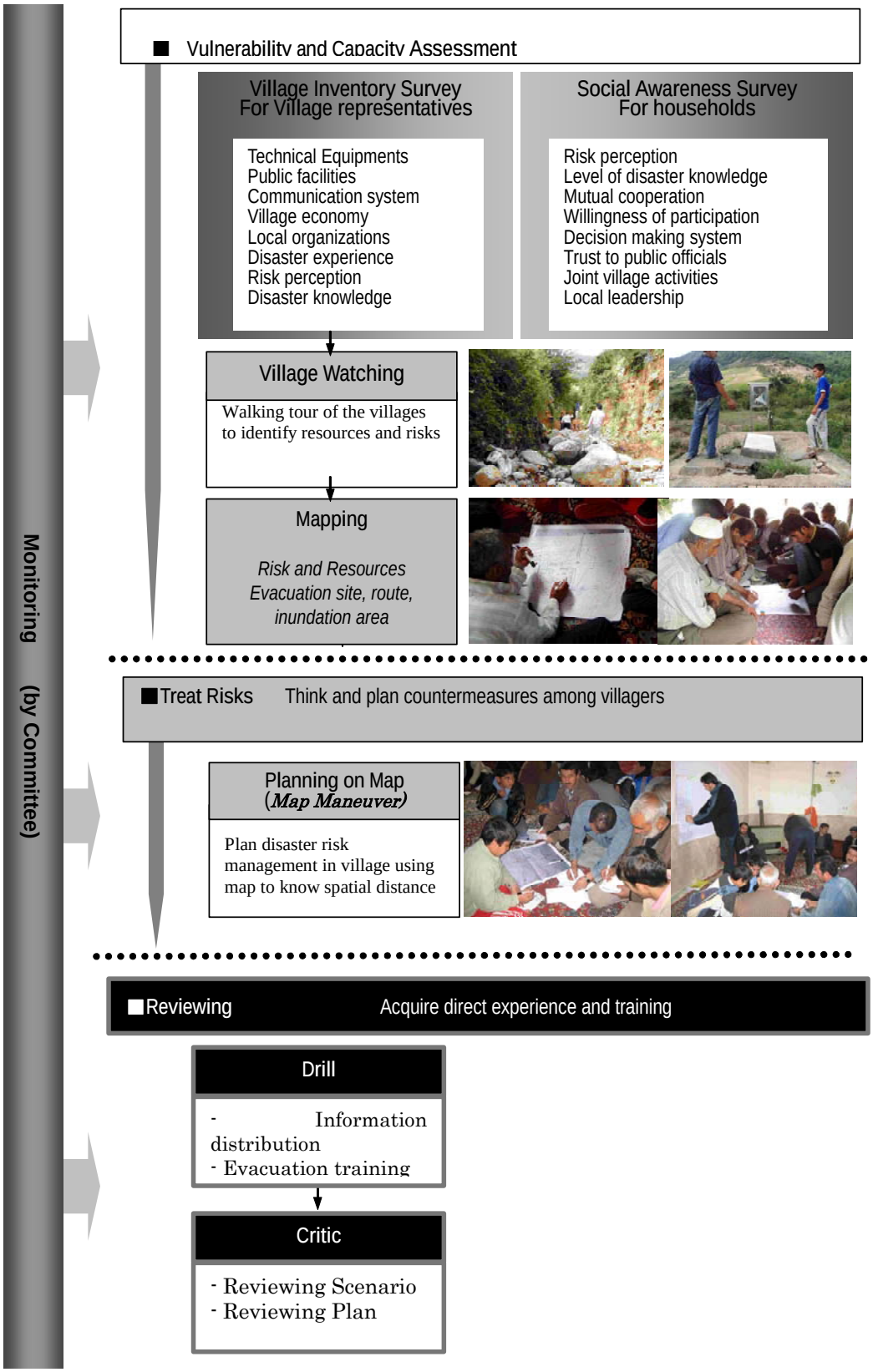


Fig. 6.12 Pilot Activities

6.4 Framework of Village Disaster Risk Management

Framework of village disaster risk management has been delineated in the following table.

Table 6.3(1) Recommended Task Target Matrix

Number	Task	Item	Description	Target			
				Public Sector	Villagers	Schools	Tourist
1	**Risk Communication**	**Disseminate accurate weather information**	Accurate timely weather information from Meteorological office to mass media. TV telop need to run to give timely warning of heavy rain.	◎			
		Understand distributed hazard map	Hazard map prepared by JICA team need to be authorized by the Golestan provincial government and Red Crescent Society trainers explain about the hazard map during village workshops. It can be used for mapping exercise.	◎			
		Village Watching and Risk and resource mapping	Villagers conduct Village Watching, which is a walking tour of village, to understand the location and size of the risk and resources in villages. The surveyed information will be included in the village risk and resource map. Since the prepared hazard map covers wide area, villagers will prepare village focused big scale map during workshops. Same exercise can be done at school. Red Crescent Society trainers will be facilitator. Recommended Scale: at least 1/2,000,1/5,000	○	◎	◎	
2	**Public Awareness Raising**	**Public Information Dissemination**	Utilizing mass media; TV, radio, and newspapers for disseminating disaster mitigation information, introducing activities of public authorities. Producing leaflets, pamphlets, booklets for disseminating disaster knowledge for villagers, passengers, and tourists in the National Park, promoting preparedness among villagers.		◎	◎	◎
		School Education	Draw up School Curriculum in proportion to different levels of class and authorize it for the national standard. Schools located in vulnerable villages need to conduct tentative programs urgently.	○		◎	
		Signboard and Notice board of Flood Risk for Tourists and Passengers	Signboards to inform flood risk in the Golestan National Park will be constructed. Small place to inform flood risk in museum of the Park will be provided by DOE. Past disaster situation, disaster experience, and damage photos are displayed.	○			◎
		Holding Seminars, Workshops	Seminars, workshops will be held for raising awareness of the general public.	○	◎	◎	◎

Table 6.3(2) Recommended Task Target Matrix

Number	Task	Item	Description	Target			
				Public Sector	Villagers	Schools	Tourists
3	**Human Resource Development**	**Administrator Training**	Training administrators to gain knowledge for daily services. Expert of Red Crescent Society will be trained for village council members and village leaders to train as trainers.	◎			
		Training of Local Leaders	Training village council members and voluntary leaders in the villages with specific and practical knowledge to lead the village based disaster risk management activities such as planning, information dissemination, issuing evacuation order, rescue, first-aid, and relief in the emergency situation. Red Crescent Society will train village leaders.		◎		
		Conducting Village Workshops by Village Leaders	Trained village council members and voluntary members will hold village workshops to plan village disaster risk management, educate disaster knowledge, train emergency responses, and conduct drills by support of Red Crescent Society.	○	◎		
		Conducting Annual Drill	Yearly drill including school will be conducted by the initiative of village disaster risk management committee. Joint drill in wide area, including relevant authorities such as township and provincial disaster management center, police and Red Crescent Society can be held.	○	◎		
4	**Organizational Capacity Development**	**Formulation of Disaster Management Committee**	Disaster management committee will be formed at each village to promote understanding and responsibilities before, during and after disasters. Such responsibilities as information distribution, monitoring, evacuation, transportation, stockpile, rescue and first-aid will be designated and trained. The head of the committee plays an incident commander and make contacts with outside organizations. Red Crescent Society will give support to conduct workshops.	○	◎		
		Emergency Response	Upgrading organizational skills and capacity for emergency response including monitoring, information distribution, evacuation, rescue, first-aid etc. Red Crescent Society will give training for villagers.	○	◎		
		Strengthening Coordination	Information database of each vulnerable village will be kept at relevant organizations, which is effective during emergency situations. In ordinary time, at yearly drills, relevant organizations will co-organize the activities. Emphasis will be given to establish linkage and coordination among these organizations.	◎	◎		

Number	Task	Item	Description	Target			
				Public sector	Villagers	School	tourists
5	**Preparation of Equipment and Construction**	**Preparation of Equipments**	Village will prepare necessary tools and equipments for emergency by subsidies of local government. Those items are recommended to be used ordinary time and maintained by village council.	◎	◎		
		Construction of Shelter cum Village Cultural Center	Village cultural Center which can be used as shelter will be constructed. In vulnerable villages, no cultural facilities exist. Labor for construction is provided by villagers. Housing Foundation will discuss the construction plan with villagers.	◎	◎		
		Construction of mitigating measures	To enhance mitigation capacity of flood and debris flow, planned engineering works will be discussed with villagers. In the construction program, including villager's labor contribution is feasible.	◎	◎		

To implement village activities, Red Crescent Society is the focal organizations to train villagers. Following figure shows steps of village training and workshops.

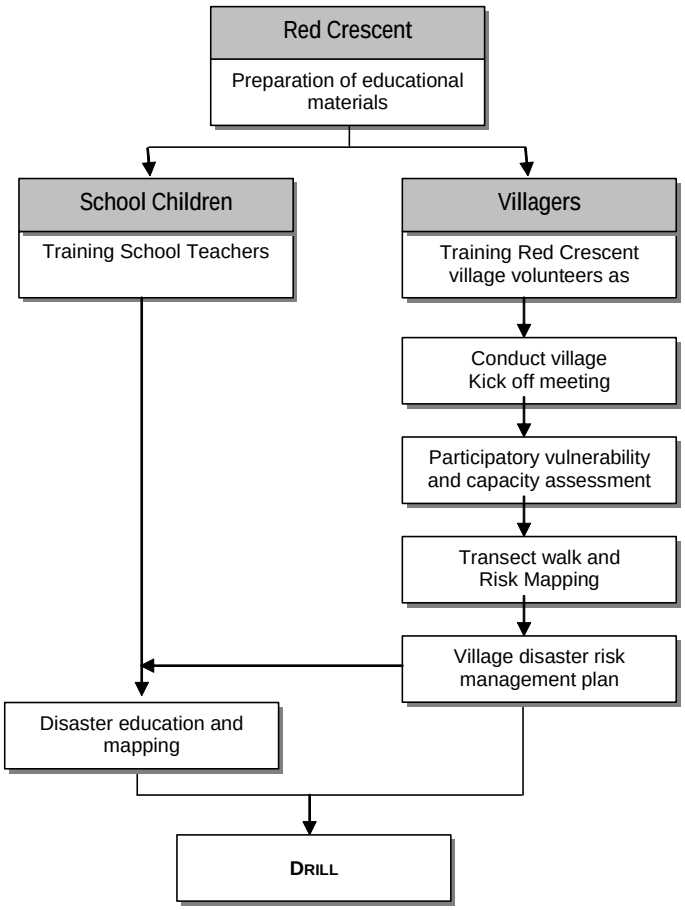


Fig. 6.13 Steps of Village Training and Activities

CHAPTER 7 COST ESTIMATE AND IMPLEMENTATION PROGRAM

7.1 Cost Estimate of the Priority Projects

7.1.1 Priority Project Components

The project cost is estimated for three schemes, which are (1) Riverbank Stabilization Works in the Madarsoo River nearby the Dasht Village, (2) Sediment Control Dam Works including the rehabilitation of the breached exiting earth dam in the Ghyz Ghaleh River and (3) Flood Forecasting and Warning System.

Additionally, the River Restoration Plan on the priority projects is composed of the riverbank stabilization work and the sediment control dam work. The flood forecasting and warning system building belongs to the Golestan Forest National Park Disaster Management Plan.

The project cost is composed of the following items:

(1) Construction Cost,

(2) Land Acquisition Cost,

(3) Compensation Cost,

(4) Administration Cost,

(5) Engineering Cost, and

(6) Physical Contingency.

7.1.2 Conditions and Method of Cost Estimate

Price Level and Exchange Rate

The cost is estimated based on August 2005 constant prices in Rials. The exchange rates to be applied are:

USD 1 = 8,996 Rials and JPY 100 = 8,025 Rials (as of August 1, 2005)

The value added tax (VAT) for all cost components and import tax for imported equipment are to be included in each unit cost.

Construction Cost

The construction cost is basically estimated on a unit price basis with multiplying the work quantity by the unit price.

The unit prices of the civil works for the riverbank stabilization works and sediment control dam works have been determined with reference to Iranian work efficiency values provided by Management and Planning Organization (MPO) in the year of 2004. The main unit prices for the civil works are tabulated in Table 7.1.

The unit prices of observation equipment on flood forecasting and warning system building are the basis of the Iranian general marketable prices obtained from the interview survey.

Table 7.1 Main Unit Prices for the Civil Works

Work Item	Unit	Unit Price (Iranian Rial)	Components of unit price (Reference Number)						Remarks
		(Adopted)	(Basis)						
Demolition Works									
Existing Revetments	m^3	16,000	10601		31301	31302			with Breaker Attachment, Hauling for 500m distance
Existing Bridge	m^3	173,000	10502		31301	31302			ditto
Existing Road Pavement	m^2	3,000	10701		31301	31302			ditto
Earth Works									
Excavation with Construction Equipment									
(Soil)	m^3	5,000	30501		31301	31302			including hauling for 500m distance
(Sand & Gravel)	m^3	7,000	30502		31301	31302			ditto
(Soft Rock)	m^3	31,000	30504		31301	31302			ditto
(Hard Rock)	m^3	19,000	30201			31302		30401	
Random Backfilling	m^3	7,000	31801	31402	31301	31302			with riverbed materials, Hauling for 500m
Backfilling with Compaction	m^3	9,000	31801	31402	31608	31301	31302		with riverbed materials, Hauling for 500m Compaction of 95%
Gravel Bedding	m^3	9,000	31801	31402	31301	31302	31501		with sieving riverbed materials, Hauling for 500m
Embankment	m^3	11,000	31608	31402	31301	31302	31501	31701	with purchasing mountain sand including compaction works (95%) with construction equipment Hauling for 500m distance
Boulder Riprap	m^3	68,000	40104	40401	31301	31302	31303		with selected riverbed materials Hauling for 5 km distance
Removal of Surplus Soil	m^3	19,000	31301	31302	31303	31304	30301		Hauling + Spreading, L=30km
Sodding	m^2	1,000	20703						
Concrete Works									
Plain Concrete	m^3	270,000	90104		60104	90303			including formwork, 18N/mm^2, Formwork =1 m^2/m^3
Plain Concrete (Ready Mixed Type)	m^3	296,000	90104	90901	60104	90303			including formwork, 18N/mm2, Formwork =1 m^2/m^3 Hauling for 30 km distance from a batcher plant
Wet Stone Masonry	m^3	227,000	40303	40402	60104				
Reinforced Concrete (including 40kg-Rebar)	m^3	448,000	90105	70202	60103		90309		including formwork and reinforcing bar, 21 N/mm^2 Unit weight composing re-bar = 40kg/m^3 & Formwork =1 m^2/m^3
Reinforced Concrete (including 20kg-Rebar)		355,000	90105	70202	60103		90309		including formwork and reinforcing bar, 21 N/mm^2 Unit weight composing re-bar = 20kg/m^3 & Formwork =1 m^2/m^3
Revetment Works									
Gabion Mattress	m^3	149,000	40106						including furnish and placement (Stone material and Frame wire)
Wet Stone Masonry	m^2	102,000							Wet Masonry (t=35cm)+Gravel Bedding (t=50cm)
Concrete Pitching	m^2	112,000							including formwork and reinforcing bar, 18N/mm^2 Unit weight composing re-bar = 6kg/m^3 & Formwork =1 m^2/m^3 Concrete (t=30cm)+Gravel Bedding (t=30cm)
Drainage Works									
Pipe Culvert Dia. 600mm	m	135,000	100904	150304					including furnish and placement, Hauling for 30km distance
Pipe Culvert Dia. 800mm	m	171,000	100906	150305					ditto
Pipe Culvert Dia. 1,000mm	m	240,000	100908	150305					ditto
Concrete Block									
2.3ton/piece	nos.	659,000	90104	70202	60101		150101		Conc.=1.02m^3, Form=4.76m^2, Hook&Shakle=30kg Miscellaneous:25%, Hauling for 5.0km
1.9ton/piece	nos.	602,000	90104	70202	60101		150101		Conc.=0.84m^3, Form=4.48m^2, Hook&Shakle=30kg Miscellaneous:25%, Hauling for 5.0km
1.2ton/piece	nos.	443,000	90104	70202	60101		150101		Conc.=0.53m^3, Form=3.92m^2, Hook&Shakle=20kg Miscellaneous:25%, Hauling for 5.0km
0.6ton/piece	nos.	301,000	90104	70202	60101		150101		Conc.=0.28m^3, Form=2.3m^2, Hook&Shakle=20kg Miscellaneous:25%, Hauling for 5.0km
0.5ton/piece	nos.	235,000	90104	70202	60101		150101		Conc.=0.24m^3, Form=1.20m^2, Hook&Shakle=20kg Miscellaneous:25%, Hauling for 5.0km

Source: Index of expenses for project related with irrigation, drainage and river improvement in the year of 2004

Land Acquisition and Compensation Cost

The cost estimate for the land acquisition and compensation is based on the cost data obtained from the MOJA-Golestan Office. The land acquisition cost depends on the individual areas in the Madarsoo River basin. The following table shows the land acquisition cost for the individual areas in the Madarsoo River basin.

Table 7.2 Land Acquisition Cost in the Madarsoo River Basin

Unit: Rials/m^2

Location / Land Use	Golestan Dam to Tangrah	Dasht
Dry Farming Land	4,000	400
Irrigated Farmland	6,000 to 8,000	3,500 to 5,000
Orchard	10,000 to 15,000	10,000 to 12,000
Residential Area	50,000 to 150,000	20,000 to 150,000

Source: MOJA – Golestan

Administration and Engineering Cost

Administration cost and engineering cost to be required for the project implementation are estimated by lump-sum basis, which is assumed at 5 % of the construction cost for the government administration, at 10 % of the construction cost for the detail design and the construction supervision as the engineering service cost, of which are based on the similar projects have undertaken by JICA; namely, “The Study on Watershed Management Plan for

Karoon River (2002)" and "The Study on Integrated Management for Ecosystem Conservation of the Anzali Wetland (2005)".

Physical Contingency

The physical contingency, which is following the said similar projects, is provided with 20 % of the sum of the construction cost, land acquisition cost, compensation cost, administration cost and engineering cost.

7.1.3 Project Cost for River Restoration Plan

Summary of Project Cost

The construction cost based on the preliminary design is estimated at 11,890 million Rials for the riverbank stabilization works and 12,060 million Rials for the sediment control dam works. The project cost for the river restoration plan totals 23,950 million Rials including indirect cost.

The respective structural measures are set on the public land such as river courses of the Madarsoo and the Ghyz Ghaleh. Therefore, it is not necessary to execute the private land acquisition under the preliminary design stage. The project cost for respective construction works is summarized as follows:

Table 7.3 Summary of the Project Cost for Riverbank Stabilization Works

Work Item	Quantity	Unit	Amount (1,000 Rials)
I. Construction Base Cost			**8,611,000**
1. Preparation Works	1	l.s.	783,000
2. Riverbank Stabilization Work	1	l.s.	7,828,000
II. Land Acquisition Cost			**0**
III. Administration Cost (5% of Item I)	1	l.s.	**431,000**
IV. Engineering Cost (10% of Item I)	1	l.s.	**862,000**
V. Physical Contingency (20% of Item I + II + III + IV)	1	l.s.	**1,981,000**
VI. Total			11,885,000
Round Total			**11,890,000**
in accordance with (as of August 2005)			US$1,322,000

Table 7.4 Summary of the Project Cost for Sediment Control Dam Works

Work Item	Quantity	Unit	Amount (1,000 Rials)
I. Construction Base Cost			**8,739,000**
1. Preparation Works	1	l.s.	795,000
2. Sediment Control Dam	1	l.s.	7,944,000
II. Land Acquisition Cost			**0**
III. Administration Cost (5% of Item I)	1	l.s.	**437,000**
IV. Engineering Cost (10% of Item I)	1	l.s.	**874,000**
V. Physical Contingency (20% of Item I + II + III + IV)	1	l.s.	**2,010,000**
VI. Total			12,060,000
Round Total			**12,060,000**
in accordance with (as of August 2005)			US$1,341,000

In Addition, based on the construction cost, the government administration cost, engineering service cost and physical contingency cost are calculated as a lump sum basis. Furthermore, these breakdown mentioned above table are described in 7.1.5 as Appendix.

Establishment of Construction Time Schedule

(1) Production Rate Estimate

Using conventional construction equipment available for the project, the daily production rate of main work items is estimated as follows:

Table 7.5 Daily Production Rates of Main Construction Works

Work Item	Daily Work Ability	Remarks
Concrete Production	120 m^3/day	With batcher plant
Concrete Placement	95 m^3/day	Including formwork
Excavation	220 m^3/day	Bucket: 0.8m^3
Embankment (15 ton bulldozer)	190 m^3/day	Including compaction
Conc. Block Production	20 pieces/day	With steel formwork
Conc. Block Placement	50 pieces/day	With truck crane

Basis of the estimated daily work ability is referred to the work efficiency in Japan supervised by the Ministry of Land, Infrastructure and Transport, Japan.

(2) Construction Time Schedule for the Riverbank Stabilization Works

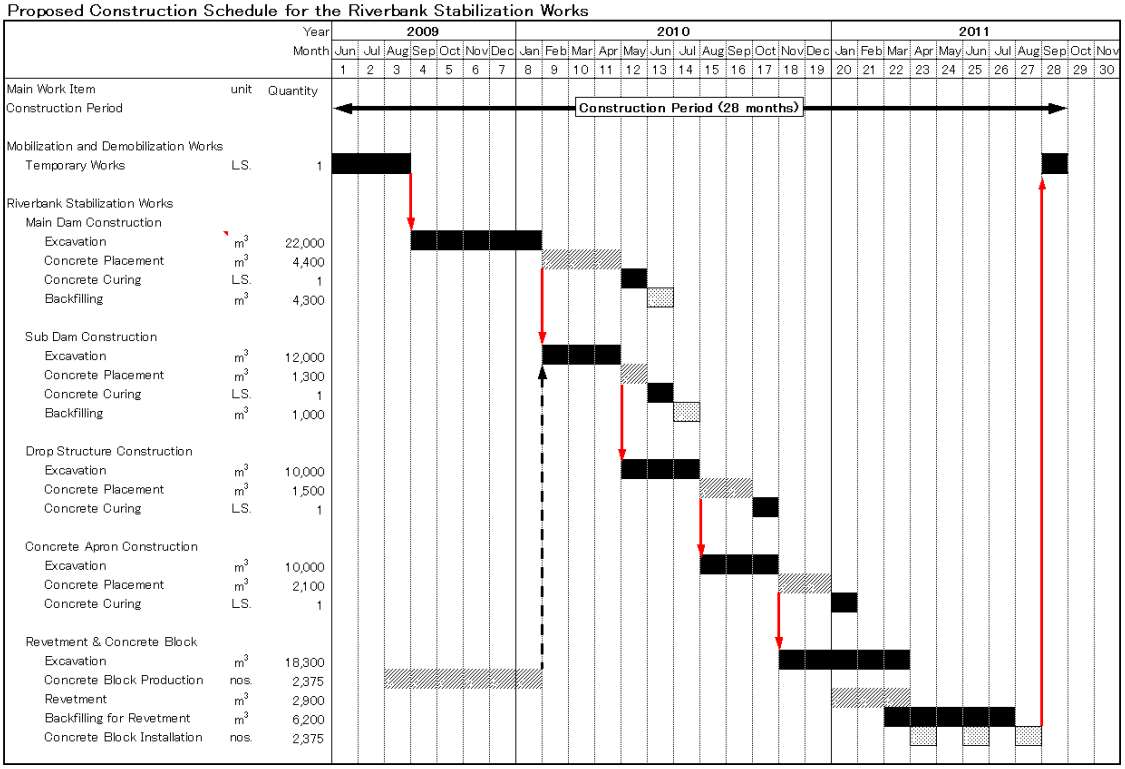
In consideration of the above estimated construction work ability, construction time schedule shall be drawn up, generally finding out the critical path, which causes the overall construction period to significantly spend the longest construction time, from the work quantities.

Excavation work with the amount of 72,000 m^3 is assumed to be the critical path in this works, and the adverse progress of excavation works might affect the construction time schedule extension, directly. The construction site dose not have the sufficient open space to employ several construction parties including back hoe and dump truck since the construction site is located in the narrow pass of the river.

Therefore, it is assumed that the number of construction parties for excavation works is two parties in maximum, which are individually arranged in the upstream and downstream of the nick point for the early period of the construction stage.

The construction time schedule is estimated for 28 months from June 2009 to September 2011. The proposed construction time schedule is shown in the following figure, taking into account the excavation work formation as the critical path.

Fig. 7.1 Construction Time Schedule for Riverbank Stabilization Works



(3) Construction Time Schedule for the Sediment Control Dam Works

The construction works for the sediment control dam is proposed to execute the phased construction divided into two stages. One is the new floodway construction, the other is rehabilitation of existing earth dam breached by the 2001 Flood since the construction site is protected from the flood damage with the new floodway as temporary diversion channel.

Excavation work with the amount of 92,000 m^3 and embankment works including the upstream soil blanket construction are assumed to be the critical path in this works and the embankment materials acquisition is planed with excavation of the surplus section on existing earth dam.

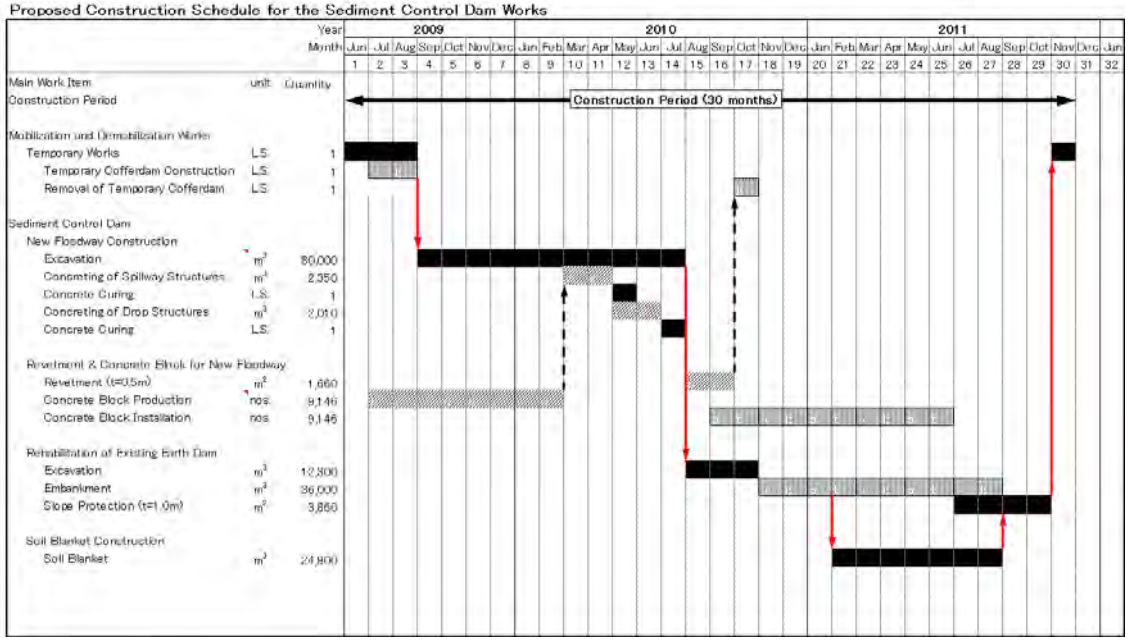
Therefore, it is difficult that the excavation works parallel the embankment works for the rehabilitation of the existing dam and upstream soil blanket construction.

Furthermore, the floodway construction needs being prior execution in order to prepare the flood damage prevention during the new earth dam construction.

It is assumed that the number of construction parties for excavation works is two parties in maximum, which are individually arranged in the right and left sides of the existing earth dam for the early period of the construction stage.

The construction time schedule is estimated for 30 months from June 2009 to November 2011. The proposed construction time schedule is shown in the following figure, taking into account the formation based on the relation between excavation works and embankment works.

Fig. 7.2 Construction Time Schedule for Sediment Control Dam Works



Establishment of Disbursement Schedule for the River Restoration Plan

Assuming an annual progress of construction works from the implementation schedule based on the construction time schedule, disbursement schedule of project cost is produced as shown in Table 7.6.

The construction of the river restoration plan is expected to commence in the year of 2009.

Table 7.6 Disbursement Schedule for River Restoration Plan

(Unit: x 1,000 Rials)

Item	Total Cost	2007	2008	2009	2010	2011
I Construction Cost						
1 Riverbank Stabilization Works	8,611,000	0	0	2,497,190	4,133,280	1,980,530
				0.29	0.48	0.23
2 Sediment Control Dam Works	8,739,000	0	0	3,408,210	2,971,260	2,359,530
				0.39	0.34	0.27
II Land Acquisition and Compensation Cost	0	0	0	0	0	0
III Administoration Cost	868,000	303,800	173600	130,200	130,200	130,200
(5 % of Item I)		0.35	0.20	0.15	0.15	0.15
IV Engineering Cost	1,735,000	607,250	347,000	260,250	260,250	260250
(10% of Item I)		0.35	0.20	0.15	0.15	0.15
V Physical Contingency	3,991,000	199,550	119,730	1,277,120	1,516,580	878,020
(20% of Item I + II + III + IV)		0.05	0.03	0.32	0.38	0.22
VI Total (I to V)	**23,944,000**	**1,110,600**	**640,330**	**7,572,970**	**9,011,570**	**5,608,530**

7.1.4 Project Cost for Golestan Forest National Park Disaster Management Plan

The project cost based on the preliminary design is estimated at 4,282 million Rials. The system building works are set on the public land such as existing gauging stations and the main waterway, therefore, it is not necessary to execute the private land acquisition under the preliminary design stage. The project cost for the system building work is summarized as follows:

Table 7.7 Summary of the Project Cost for Golestan Forest National Park Disaster Management Plan

Work Item	Quantity	Unit	Amount (1,000 Rials)
I. Construction Base Cost			**3,103,000**
1. Preparation Works	1	l.s.	218,000
2. Observation Equipments	1	l.s.	2,361,800
3. Equipment Installation Cost	1	l.s.	363,000
4. Water Leve Gauging Station	2	S/T	160,200
II. Land Acquisition Cost			**0**
III. Administration Cost (5% of Item I)	1	l.s.	**155,000**
IV. Engineering Cost (10% of Item I)	1	l.s.	**310,000**
V. Physical Contingency (20% of Item I + II + III + IV)	1	l.s.	**714,000**
VI. Total			4,282,000
Round Total			**4,282,000**
in accordance with (as of August 2005)			US$476,000

In Addition, based on the construction cost, the government administration cost, engineering service cost and physical contingency cost are calculated as a lump sum basis. Assuming an annual progress of construction works from the implementation schedule, disbursement schedule of project cost is produced as shown in Table 7.8.

Construction of the new water level gauging station is assumed to be the critical path in this works, and it is estimate that the furnishing of station well and cabin is spent for four months and its equipment installation for four months, respectively. The execution of this plan is expected to commence in the year of 2009 as well as the said river restoration plan.

Table 7.8 Disbursement Schedule for Golestan Forest National Park Disaster Management Plan

(Unit: x 1,000 Rials)

Item	Total Cost	2007	2008	2009	2010	2011
I Construction Cost						
1 Flood Forecasting and Waning System	3,103,000	0	0	2,544,460	558,540	0
				0.82	0.18	
II Land Acquisition and Compensation Cost	0	0	0	0	0	0
III Administoration Cost (5 % of Item I)	155,000	0	0	69,750	62,000	23,250
				0.45	0.40	0.15
IV Engineering Cost (10% of Item I)	310,000	0	0	139,500	124,000	46500
				0.45	0.40	0.15
V Physical Contingency (20% of Item I + II + III + IV)	714,000	0	0	549,780	149,940	14,280
				0.77	0.21	0.02
VI Total (I to V)	**4,282,000**	**0**	**0**	**3,303,490**	**894,480**	**84,030**

7.1.5 Appendix

Table 7.9 Cost Breakdown for Riverbank Stabilization Works

Alternative-2

Work Item	Quantity	Unit	Unit Price (Rials)	Amount (1,000 Rials)
I. Construction Base Cost				**8,611,000**
1. Preparatory Works	1	l.s.		783,000
(10% of Sub-total of Item 2 to 3)				
2. Riverbank Stabilization Work for Madarsoo River at Dasht Village				7,828,000
a. Excavation				
- Sand & Gravel	72,300	m^3	7,000	506,100
b. Random Backfilling	9,560	m^3	7,000	66,920
c. Backfilling with Compaction	1,940	m^3	9,000	17,460
d. Embankment		m^3	11,000	0
e. Removal of the Surplus Soil	61,000	m^3	19,000	1,159,000
f. Gravel Bedding	3,210	m^3	9,000	28,890
g. Sodding	1,730	m^2	1,000	1,730
h. Concrete				
- Plain Concrete	8,550	m^3	270,000	2,308,500
- Reinforced Concrete (including 20kg rebar)	1,270	m^3	355,000	450,850
- Wet Stone Masonry	2,880	m^3	227,000	653,760
i. Gabion Mattress	710	m^3	149,000	105,790
j. Concrete Block				
- 1.9ton/piece	1,080	nos.	602,000	650,160
- 1.2ton/piece	1,295	nos.	443,000	573,685
k. Miscellaneous	1	l.s.		1,305,155
(20% of "a" to "j")				
II. Land Acquisition Cost				**0**
a. Dry Farming Land	0	m^2	400	0
b. Irrigated Land	0	m^2	4,200	0
c. Orchard	0	m^2	11,000	0
d. Residential Area		m^2	60,000	0
III. Administration Cost	1	l.s.		**431,000**
(5% of Item I)				
IV. Engineering Cost	1	l.s.		**862,000**
(10% of Item I)				
V. Physical Contingency	1	l.s.		**1,981,000**
(20% of Item I + II + III + IV)				
VI. Total				11,885,000
Round Total				**11,890,000**

Table 7.10 Cost Breakdown for Sediment Control Dam Works

Alternative-C

Work Item	Quantity	Unit	Unit Price (Rials)	Amount (1,000 Rials)
I. Construction Base Cost				**8,739,000**
1. Preparatory Works (10% of Sub-total of Item 2 to 3)	1	l.s.		795,000
2. Sediment Control Dam (including rehabilitation of the breached existing dam)				7,944,000
a. Excavation				
- Sand & Gravel	92,300	m^3	7,000	646,100
b. Random Backfilling	2,500	m^3	7,000	17,500
d. Embankment	36,000	m^3	11,000	396,000
c. Soil Blanket	24,900	m^3	11,000	273,900
e. Removal of the Surplus Soil	29,000	m^3	19,000	551,000
f. Sodding	2,500	m^2	1,000	2,500
g. Concrete				
- Plain Concrete	2,010	m^3	270,000	542,700
- Reinforced Concrete (including 20kg rebar)	2,350	m^3	355,000	834,250
- Wet Stone Masonry	830	m^3	227,000	188,410
h. Slope Facing				
- Cobble- Gravel Facing (t=50cm)	1,930	m^3	34,000	65,620
- Gravel- Sand facing (t=50cm)	1,930	m^3	9,000	17,370
i. Gabion Mattress	2,090	m^3	149,000	311,410
j. Concrete Block				
- 1.9ton/piece		nos.	602,000	0
- 1.2ton/piece		nos.	443,000	0
- 0.6ton/piece	9,146	nos.	301,000	2,752,946
- 0.5ton/piece		nos.	235,000	0
- Gravel Bedding under the Conc. Block	2,200	m^3	9,000	19,800
k. Miscellaneous (20% of "a" to "j")	1	l.s.		1,324,494
II. Land Acquisition Cost				**0**
a. Dry Farming Land	0	m^2	400	0
b. Irrigated Land	0	m^2	4,200	0
c. Orchard	0	m^2	11,000	0
d. Residential Area		m^2	60,000	0
III. Administration Cost (5% of Item I)	1	l.s.		**437,000**
IV. Engineering Cost (10% of Item I)	1	l.s.		**874,000**
V. Physical Contingency (20% of Item I + II + III + IV)	1	l.s.		**2,010,000**
VI. Total				12,060,000
Round Total				**12,060,000**

7.2 Implementation Program

Fig. 7.3 shows the proposed implementation schedule for the priority projects, for which the feasibility study has been conducted, excluding flood preparedness plan. The implementation period for these priority projects is set for five (5) years, taking into account the additional survey and investigation for detail design, detail design execution, tendering and other preparatory activities.

The commencement of the respective projects is set on the early in June of the year since the month is in accordance with the commencement of the Iranian fiscal year and the duration of pre-construction stage is adopted for one year, which is about the same as the duration of general local tendering based on the interview to the MOJA personnel. The details are as follows:

Riverbank Stabilization Works

The riverbank stabilization works is scheduled to commence from middle of 2009 for the construction work, which is set taking into consideration of the lead time for the pre-construction activities such as pre-qualification for contractors, tendering, its evaluation and conclusion of contract agreement between MOJA and selected contractor.

The required construction period is estimated for 28 months and overall project period is for 50 months. The project cost including indirect cost is estimated at 11.9 billion Rials.

Sediment Control Dam Works

The sediment control dam works is scheduled to commence from middle of 2009 for the construction work, which is set taking into consideration of the lead time for the pre-construction activities such as pre-qualification for contractors, tendering, its evaluation and conclusion of contract agreement between MOJA and selected contractor.

The required construction period is estimated for 30 months and overall project period is for 52 months. The project cost including indirect cost such as administration cost, engineering cost and physical contingency is estimated at 12.1 billion Rials.

Flood Forecasting and Warning System

The establishment of Flood Forecasting and Warning Center (FFWC) as the executing agency is proposed before the commencement of this execution.

FFWC takes an active role in creation of a highly accurate flood notice for PDMC flood disaster management based on the meteorological data and water level from MOG and MOE, respectively.

It is assumed that the executing agency establishment period might be required for two (2) years including concurrence among the agency concerned, the personnel arrangement, the budget arrangement, etc.

The detail design stage for flood forecasting and warning system building is scheduled to commence from the middle of 2009, succeedingly, tendering stage including the required equipments procurement in the early of 2010.

The required installation period is estimated for 8 months and overall project period is for 26 months. The project cost without operation and maintenance (O/M) cost is estimated at 4.3 billion Rials.

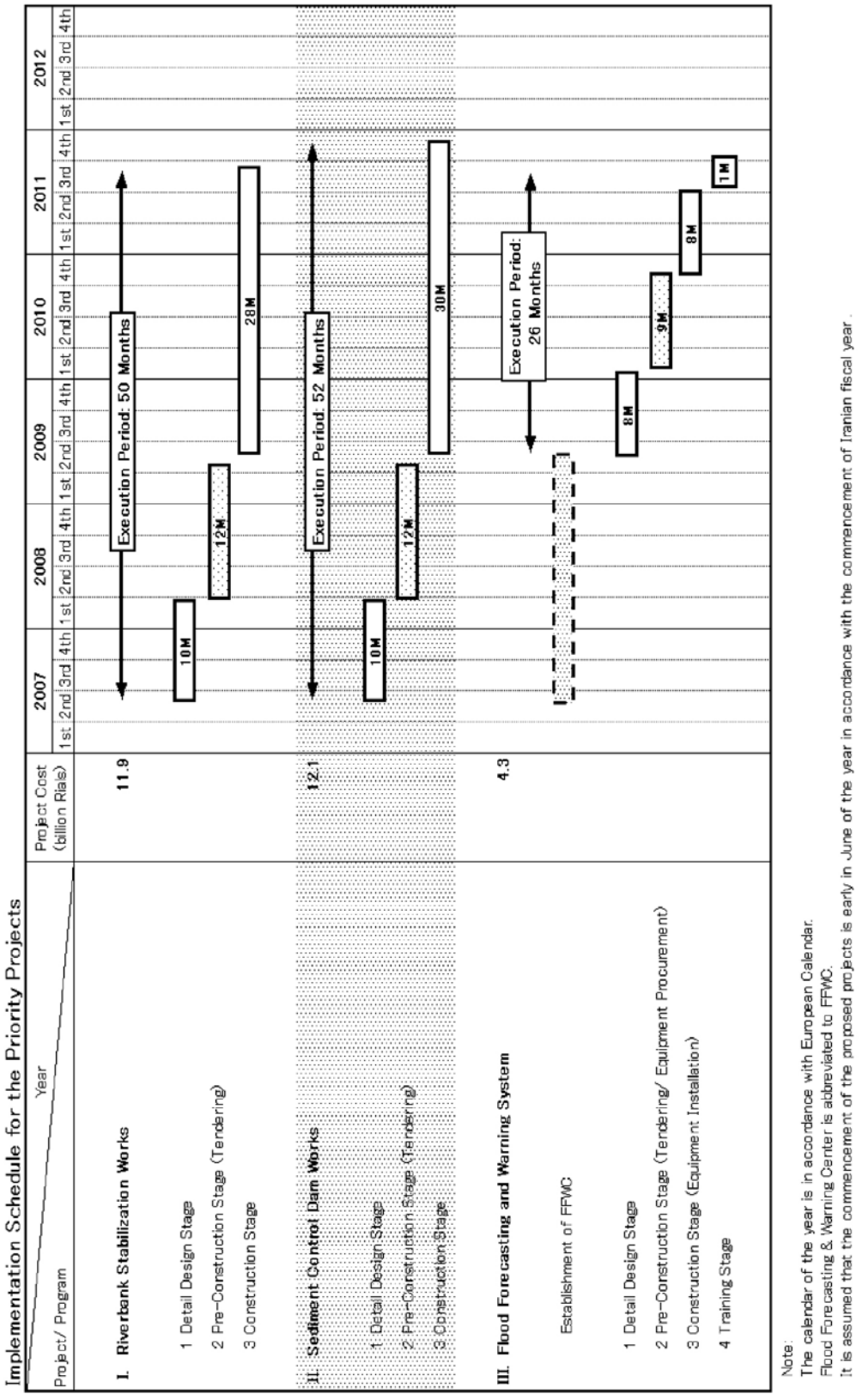


Fig. 7.3 Implementation Schedule for the Priority Projects

CHAPTER 8 PROJECT EVALUATION

8.1 Economic Evaluation

The adopted priority project consists of 3 components as (1) River Restoration Plan, (2) Golestan Forest Park Disaster Management Plan, and (3) Flood Preparedness Plan. Results of the economic evaluation are given by each component hereunder.

8.1.1 River Restoration Plan

The River Restoration Plan consists of three works as (1) the Watershed Management Plan (WMP), (2) the Sediment Control Works (SCD = Sediment Control Dam works) and (3) the Erosion Control Works (ECD = Erosion Control Dam works).

Followings are the basic unit for estimation of the economic benefits of each work.

Table 8.1 Summary of Basic Unit for Estimation of Economic Benefit Expressed by Land Value

(million Rials/ha)

Land Value Due to Execution of Sediment Control Works and erosion Control Works						Land Value Newly Developed Productive Area Due to Execution of Watershed Management Works	
Residential Area			Irrigated Agricultural Area			Farm Land	Range Land
Houses and Movables	Public Facilities (20%)	Total	Productivity to be Saved	Public Facilities (10%)	Total	New Production of Farm Land	Damages to Productivity
566.95	113.39	680.35	5.78	0.58	6.36	56.65	0.24

The annual average damages are calculated by means of the Probability Analysis except WMP. The works of WMP is not fit for probability analysis because that the Plan is not appearance suddenly be coming like natural disaster as flood, but it is human voluntary works to execute under the certain schedule.

Works for WMP

The planned areas for WMP consist of (1) Dasht-e-Sheikh Area with 120 ha for terracing works and 1,360 ha for banquette works both for farmland and with 17,534 ha for rangeland, and (2) Ghiz Ghaleh Area with 125 ha for terracing works and 180 ha for banquette works for farmland and 6,350 ha for rangeland.

The works for WMP are human voluntary works to execute under the certain schedule as mentioned above. Thus full execution may not be expected because there will be several hurdle to be cleared as endless maintenance for terraces and banquettes and so on. From this viewpoint, rather conservative execution rate of 75 % is assumed to execute. And, the area for the works for WMP broaden out of the targeted catchments, so that it is also assumed that the benefit will accrue one fourth (1/4) for Dasht-e-Sheikh Area, and one third (1/3) for Ghiz Ghaleh Area.

Based on the above mentioned assumptions, the annual average benefits derived from the works for WMP in the Dasht-e-Sheikh and Ghiz Galeh basins are calculated as Rials 21,229 million and Rials 5,403 million from farm land, and Rials 707 million and Rials 377 million from rangeland, respectively.

Works for SCD

As mentioned above, the annual average economic benefit for the works for SCD is estimated by means of probability analysis. In this case, the works for WMP is contributed a little bit because that the works for WMP has also a capability of sediment control. The following table shows its result. The target year is set at 2025. The benefit (= the amount of damages expected to be decreased with the Project) is estimated under both of the present and the 2025-year conditions.

Table 8.2 Estimation of Annual Average Economic Benefit Due to Execution of SCD

WMP and SCD under the Present Condition (Million Rials)

Return Period (Year)	Under the Witout Project Condition	Under the Condition with WMP		Under the Condition with WMP + SCD	
		Remaining Damages	Benefit	Remaining Damages	Benefit
1	0	0	0	0	0
5	1,361	1,361	0	0	1,361
10	1,905	1,905	0	0	1,905
25	2,517	2,497	20	0	2,517
50	2,796	2,762	34	0	2,796
100	**2,956**	**2,915**	**41**	**0**	**2,956**

WMP and SCD under 2025 Year Condition (Million Rials)

Return Period (Year)	Under the Witout Project Condition	Under the Condition with WMP		Under the Condition with WMP + SCD	
		Remaining Damages	Benefit	Remaining Damages	Benefit
1	0	0	0	0	0
5	1,944	1,944	0	0	1,944
10	2,722	2,722	0	0	2,722
25	3,597	3,567	29	0	3,597
50	3,995	3,946	49	0	3,995
100	**4,224**	**4,165**	**58**	**0**	**4,224**

(Note) WMP: Contribution from the works on Watershed Management Plan.
SCD: The works on Sediment Control Dam.

Works for ECD

Also as mentioned above, the annual average economic benefit for the works for ECD is estimated by means of Probability Analysis. The following table shows its result. The target year is set at 2025. The benefit (= the amount of damages expected to be decreased with the Project) is estimated under both of the present and the 2025-year conditions.

Table 8.3 Estimation of Annual Average Economic Benefit Due to Execution of ECD

ECD under the Present Condition (Million Rials)

Return Period (Year)	Under the Witout Project Condition	Under the Condition with ECD	
		Remaining Damages	Benefit
1	0	0	0
5	1	0	1
10	2	0	2
25	3	0	3
50	4	0	4
100	**5**	**0**	**5**

ECD under 2025 Year Condition (Million Rials)

Return Period (Year)	Under the Witout Project Condition	Under the Condition with ECD	
		Remaining Damages	Benefit
1	0	0	0
5	3	0	3
10	5	0	5
25	7	0	7
50	8	0	8
100	**10**	**0**	**10**

(Note) ECD: The works on Erosion Control Dam.

Summary of financial and economic costs and their annual disbursement is showing in the following table.

Table 8.4 Summary of Project Cost and Annual Disbursement

(Million Rials)

Item	Total Cost	Disbursement							
		2007	2008	2009	2,010	2011	2012	2013	2014
Financial Cost in Total	79,415	19,291	8,694	18,228	16,086	14,039	2,717	180	180
Economic Cost Converted	68,860	17,414	7,843	15,467	13,335	12,022	2,453	163	163

The annual operation and maintenance cost (OM Cost) is applied at 3 % of the initial investment cost for the WMP, and 0.5 % of the direct construction cost is applied for the other two works. The amount of OM Cost is a sum of Rials 1,936 million per annum after completion of both the works.

Using a cash flow of the said cost and benefit, the economic evaluation is made. For evaluation, the Net Present Value (NPV, i.e. B-C in terms of the present value), the Economic Internal Rate of Return (EIRR) and the Benefit-Cost Ratio (B/C Ratio) are applied as evaluation indicators. The discount rate is applied at 10 % taking similar projects in developing countries into account.

The results are summarized as shown in the following table.

Table 8.5 Summary of Economic Evaluation Result

Evaluation Indicator	Under Present Condition	Under 2025-year Condition
NPV	81,207	85,754
EIRR	18.74 %	19.18 %
B/C Ratio	2.89	2.99

Note: NPV is expressed by million Rials

As shown in the above table, the Project indicates a quite high viability to execute by showing the 18.74 % of EIRR under the present socio-economic condition (hereinafter referred to as “at present condition”) and 19.18 % under the socio-economic condition of the year 2025.

EIRR changes its value depending on the parameters employed for the calculation. Out of these parameters, the construction cost of the Project and its benefit are the most important determinants of the economic analysis. Thus case studies are made taking execution rate into account for the Watershed Management Plan as (1) full execution, in other words “In Case of Execution Rate of Watershed Management Plan: 100 %” as Alternative Case 1, and (2) half of execution, in other words “In Case of Execution Rate of Watershed Management Plan: 50 %” as Alternative Case 2 in addition to the Original Case as mentioned above.

From the above viewpoint, a Sensitivity Test of EIRR of the Project at 2025-Year condition is made in 16 combination cases for all the Alternatives including base case of the Original Case as (1) Cost: 10 % decrease, (2) Cost: base, (3) Cost: 10 % increase, and (4) Cost: 20 % increase, and (5) Benefit: 10 % decreased, (6) Benefit: base, (7) Benefit: 10 % increase and (8) Benefit: 20 % increase.

As a result, most pessimistic case of the Alternative Case 2 with the condition of Cost: 20 % increase and Benefit: 10 % decrease, the resulted EIRR becomes as 12.26 %. It means that the Project of River Restoration Plan has enough viability to execute. Of course, the higher is the better in EIRR. Accordingly, it is strongly requested to promote the execution of the Watershed Management Plan prior to realization of the River Restoration Plan.

Following figure with table shows illustrated process of sensitivity analysis in the Original Case as an example for reference:

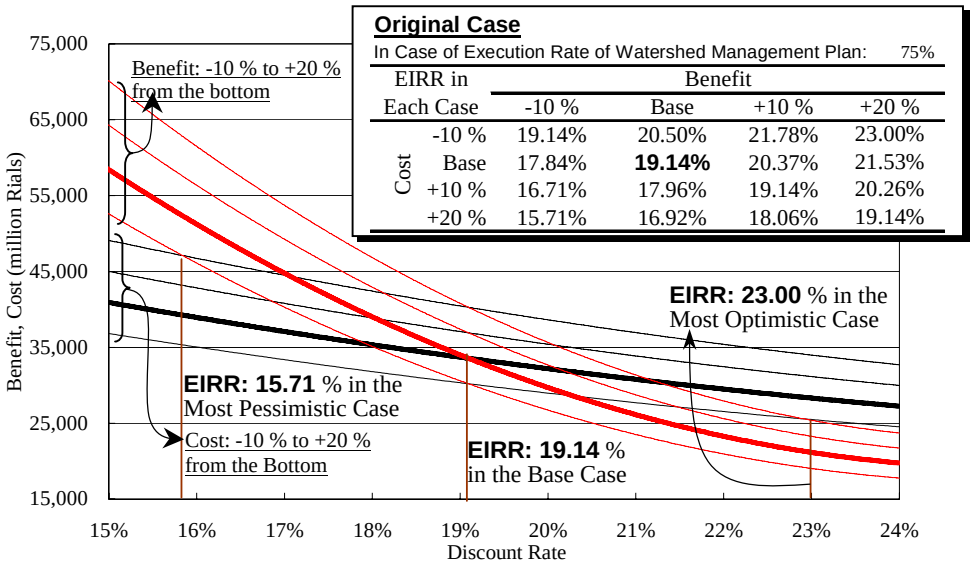


Fig. 8.1 Sensitivity Analysis for Original Case

8.1.2 Golestan Forest Park Disaster Management Plan

The Golestan Forest National Park (hereinafter referred to as "the Golestan Forest") has only one route passing through it. Before the 2001 Flood, this route was using for religious purpose and/or a business purpose from the City of Gorgan to the City of Mashad or vice versa in addition to a recreation purpose. But after the said flood, the Government has provided another detour route for the business purpose. Therefore, for estimation of economic benefit of this component, it may be enough to be taken damages to people for the recreation purpose as campers or visitors to the Golestan Forest into account.

There are a lot of attractive places and/or historical heritage in the Golestan Province including the Golestan Forest. Following table shows a numbers of tourists together with the museum of the Golestan Forest.

Table 8.6 Number of Tourists in Golestan Province and Visitors of Museum of Golestan Forest

Year	Number of Tourists in the Golestan Province (People/annum)			Number of Visitors to DOE Museum of Golestan Forest National Park (People/annum)	
	Domestic People	Foreigners	Total	Number of Visitors	Remarks
2000	42,518	648	43,166	n.a.	Before the 2001-Flood/Debris Flow, the number of visitors were around 30 % higher than the number of 2001 and it has been increased by 5 – 10 % every year. And, the visitors do not always enjoy in the Golestan Forest National Park.
2001	21,957	420	22,377	10,912	
2002	32,368	482	32,850	8,526	
2003	112,735	1,074	113,809	5,159	
2004	114,802	1,657	116,459	7,850	

Sourse: The Cultural Heritage and Tourism Organization(CHTO), Gorgan.

Among the data above, the number of visitors to the museum of the Golestan Forest is somewhat relating to the people for recreation purpose passing through the Golestan Forest, but all of them may not entirely enter into the Golestan Forest for recreation purpose.

There is another information as follow:

Table 8.7 Information on Visitors to Restaurants near Both Entrances of the Golestan Forest

Average Number of Visitors to Take Lunch in the Restaurants Located Near the Entrances of the Golestan Forest at the Up-stream Side and Down-stream Side of the Madarsoo River	500,000 People/ annum

Remarks:
There are restaurants near the entorances in up-stram side and in down-stream side, and some campers and/or visitors take their lunch at these restaurants. However, 2 times or 3 times of this number of campers and/or visitors carry their own cokking sets, and they cook by themselves for their lunch and/or dinner. Therefore, this number does not reflect the actual number of campers and/visitors to the Golestan Forest National Park. But, it may be sure that this number of people must be visited to the Park for their recreation.

Sourse: The Cultural Heritage and Tourism Organization(CHTO), Gorgan.

If one tenth (1/10) of the above number of visitors to the restaurants near both entrances of the Golestan Forest is usually visiting to the Golestan Forest shown in above Table 8.7, average number of campers and/or visitors for recreation purpose will be calculated at 208 people per day as shown in Box 2.1 hereunder.

On the other hand, according to the information, 194 persons have lost their lives with no any survivals because the route passes through at the center of narrow valley at the 2001 Flood. This is not so much different number with the above mentioned calculated one. From this viewpoint, it may say that the said assumption is reasonable. If it is assumed that, (1) frequency of flood in the Golestan Forest is one fifth (once every 5 years, in other words the frequency: 20 %), (2) the average expected working period: 20 years (average age of campers and/or visitors who are working at present: 40 years old), (3) the annual damages to human life caused by flood in the return period of 50 years can be estimated at Rials around 5,875 million/annum [=Rials 55,521,629×0.7(life cost: 30 % should be deducted)×16.804 (Coefficient of New Hoffmannsche Methode)×45 families×20 %(discount rate for estimation safety)]. Following box is a pigeonhole of the said assumption and estimation process.

Box 2.1 Estimation of Damages to Human Life due to Flood in the Golestan Forest

(1)	Annual Average Visiters to the Golestan Forest National	50,000	Assumed at 1/10 of the above number of visitors.
	For Reference:	208	/day as an average number of peoples per day:
(2)	Population in Urban Area by Sensus 1375:	36,817,789	
(3)	Number of Households in Urban Area by Sensus 1375:	7,948,925	
(4)	Average Family Size as of 1996/97:	4.63	persons/HH
(5)	Annual Number of Families visited to the Golestan Forest National Park:	10,795	HHs/annum
(6)	Daily Number of Families visited to the Golestan Forest National Park:	45	Families/day assumed that the people may visit to the Park during 8 months from April to November.
(7)	Average Income Level of People Living in Urban Area:	55,521,629	Rials/annum estimated based on Iran Statistic Year Book 1382.
(8)	Frequensy of Flood/Debris Flow in the Golestan Folest National Park:	20%	It means that the Flood/Debris Flow may occur once 5 years according to a discharge analysis.
(9)	Average Expected Working Period Assumed after Casualtie:	27	years, in case that average age at the time of death due to flood is 40 years old.
(10)	Coefficient of New Hoffmannsche Methode:	16.804	
(11)	Average Annual Damages Caused by Flood/Debris Flow in the Golestan Forest National Park:	5,875,061	1,000 Rials/annum.

The items from (2) to (4) and (7) are excerpts from the Iranian Statistic Year Book 1382. In this case, it is assumed that almost of the campers and/or visitors who are enjoying in the Golestan Forest are the urban residents.

If a flood occurs, the people who are just enjoying in the Golestan Forest must surely lose their lives. It means that they lose their expected all the income to be gotten in the future after their ends.

As a result, the amount of around Rials 5,875 million may be lost as damages in total in case of the same scale of the 2001 Flood as shown in the above estimation. If the damages in 5-year flood are to be 1/10 of the said amount, the annual average damages to casualties caused by flood can be estimated by using a following formula:

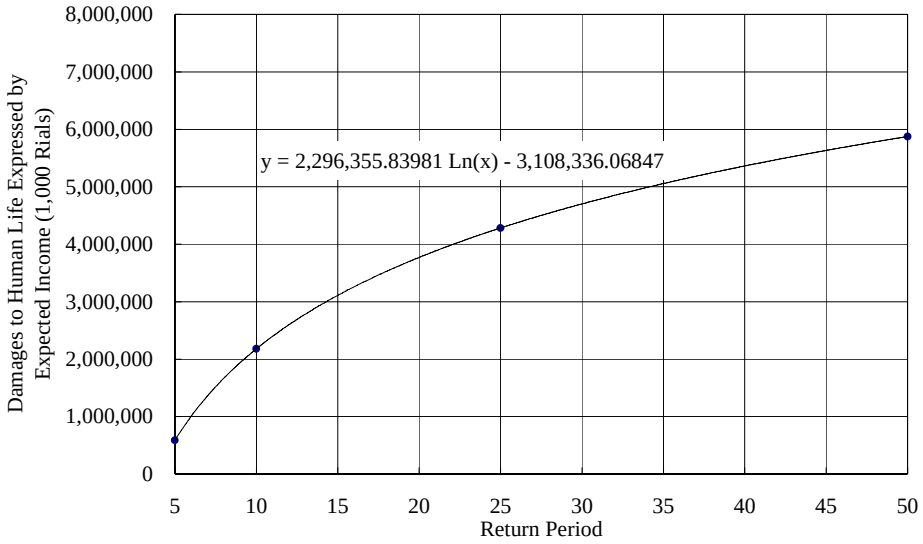


Fig. 8.2 Relationship between Return Period and Damages to Human Life Expressed by Expected Income

The resulted amount of annual average damages to expected income in total is a sum of Rials 669 million per annum as shown in the following table:

Table 8.8 Estimation of Annual Average Damages to Expected Income

Without Project — 2005-price Level (1,000 Rials)

Return Period (Year)	Exceedance	Difference of Exceedance	Direct Damages by Return Period (Million Rials)		Annual Average Damages by Return Period (Million Rials)	Cummulative Annual Average Damages (Million Rials)
			Amount	Mean	Segment	
1	1.0000	-	0	0	0	0
5	0.2000	0.8000	587,506	293,753	235,002	235,002
10	0.1000	0.1000	2,179,219	1,383,362	138,336	373,339
25	0.0400	0.0600	4,283,348	3,231,283	193,877	567,216
50	**0.0200**	**0.0200**	**5,875,061**	**5,079,205**	**101,584**	**668,800**

At present, several places destroyed caused by a few floods in the past are under rehabilitated. But, these works are only for rehabilitation to the former state. Therefore if no any drastic measures are made, the same damages will suffer again in the future. Most important measures are to inform to the people who come to enjoy in the Golestan Forest when the flood likely occurs.

A systematic flood warning system is one of such measures. This component is a plan to establish a suitable Flood Forecasting and Warning System. Annual cost disbursement is planned as follows:

Table 8.9 Annual Cost Disbursement for the Golestan Forest Park Disaster Management Plan

(Million Rials)

Item	Total Cost	Disbursement				
		2007	2008	2009	2,010	2011
Financial Cost in Total	4,282	0	0	3,303	894	84
Economic Cost Converted	3,359	0	0	2,548	727	84

The annual operation and maintenance cost of 5.9 % consisting of maintenance cost of 2.9 % as a rate of weighted mean and operation cost of 3.0 % is applied for the initial investment cost. The amount of OM cost is a sum of Rials 198 million in terms of economic value. Replacement cost of 80 % of the initial investment cost is applied. The amount of Replacement Cost is a sum of Rials 2,687 million also in terms of economic value. The replacement cost will be needed for every 10 years after completion of the works.

Using a cash flow of the said cost and benefit, the economic evaluation is made with the same manner of the above "River Restoration Plan". Also for evaluation, the Net Present Value (NPV, i.e. B-C in terms of the present value), the Economic Internal Rate of Return (EIRR) and the Benefit-Cost Ratio (B/C Ratio) are used as evaluation indicators in this component too. The discount rate is applied at 10 % taking similar projects in developing countries into account.

The results are summarized as shown in the following table.

Table 8.10 Summary of Economic Evaluation Result for Golestan Forest Park Disaster Management Plan

Evaluat-ion Indicator	Under the Present Economic Condition	Under the 2025-Year Economic Condition
NPV	1,367	2,899
EIRR	7.21%	13.70%
B/C Ratio	1.67	2.42

(Note)
NPV is expressed by million Rials.

As shown in the above table, the resulted EIRR at present condition is lower than the applied discount rate of 10 % as 7.21 %, and that at 2025-Year condition are higher than 10 % as 13.70 %.

According to the World Bank[1], the discount rate reflects the rate of fall of the value of consumption over time. Thus, if the opportunity cost of capital (OCC) in the Golestan Forest Park Disaster Management Plan is assumed to be at 5 % from the viewpoint of basic human needs, it may say that the value of consumption at present will decrease year by year by this rate over the Project life.

Here, in case that the said OCC is applied as the said discount rate[2] of 5.00 %, it may be said that the above-mentioned result of the economic evaluation under present condition is sound from the viewpoint of basic human needs.

On the other hand, the said result under 2025-year economic condition shows the Project has economic viability.

[1] William A. Ward and Barry J. Deren with Emannuel H. D'Silva, 1991 "*The Economics of Project Analysis –A Practitioner's Guide –*" EDI Technical Materials, the World Bank.

[2] –ditto–

The other sensitivity analysis is made by the same manner with and because of the same reason in the River Restoration Plan. As a result, the EIRR of the Golestan Forest Park Disaster Management Plan including its cost for operation and maintenance, and replacement for warning facilities is resulted at 13.70 % as the base case as mentioned above, and it may say the Project has an economic feasibility. But, it makes clear that the Project is rather sensitive. In a case that the Benefit will decrease by 10 % together with 20 % increase of the Cost, the EIRRs result at 9.19 %, and it may not be said that the Project has an economic feasibility in those cases.

As mentioned above, it is suggested by such several international financing institutions as the World Bank that an EIRR should be kept at least 5 % for project formation from the viewpoint of basic human needs even such projects are not based on the commercial purposes. And the Project is a pure public works. From this viewpoint, the Project has cleared such hurdle of minimum EIRR with enough rooms. Thus the evaluation result shows the Project may be sound with the EIRR being high enough from the viewpoint of basic human needs even in the most pessimistic case.

8.1.3 Flood Preparedness Plan

This component is as meaning as reading:

(1) To establish a Flood Forecasting and Warning System,

(2) To develop a suitable Criteria for Warning to be Announced,

(3) To develop Hazard Maps,

(4) To establish a System for Avoidance and/or Mitigation from or of damages of natural disasters as flood and/or debris flow for making smooth activities of evacuation from them based on the Flood Forecasting and Warning System above, Hazard Maps, and community-based Disaster Risk Management in villages located along the Madarsoo River and it's tributaries, and

(5) To take Activities as Training and/or Education for developing the Public Awareness for making people rouse their self-consciousness so that they can take smooth activities for avoiding from danger of floods.

If these systems could be practically realized and successfully functioned, social effects (or socio-economic effects) derived from such systems and such functions will be great with a little fund of the Government because the said systems could be operated by the Government's daily works.

Considerable social effects and/or socio-economic effects may be as follows:

- To save the people's life (this will mitigate the damages to all the income to be gotten in the future after their ends as already discussed above),
- To stabilize the mind of the people,
- To generate a reliability of the people against the Government, and
- To ensure the good relationship between the people and the Government.

There will be a lot of hurdles to be cleared to realize the said systems as (1) to revise the Law and the Regulation, (2) to re-structure the existing official organization of the Government, (3) to improve the relationship among the existing official organization of the Government, (4) to recruit suitable experts for the systems, (5) to improve the working system in Iran because the flood forecasting and warning system should be continuously functioned without any pause. Natural disasters do not wait for people.

But, the most important thing is to start from a part that could be easy to start. One success leads the next success. Intensities of staffs of the Government will be gradually established and ensured through this process, and the intensities of the staffs of the Government lead

further success after that. Then, the people will become to rely on the Government's staffs to do their best for operating the systems. Activities needed for avoiding and/or mitigating damages from natural disasters as floods and/or debris flow may be classified into two categories as (1) activities of villagers, and (2) activities of the Government consisting of the central Government and local governments including provinces.

Flood Forecasting and Warning System

If no any drastic measures are made, the damages recorded since 2001 Flood will suffer again in the future. Most important measures are to inform to the people who come to enjoy in and/or pass through the Golestan Forest to make them do not enter there when the flood likely occurs.

For this purpose, a systematic flood warning system is one of such measures. The component of the Golestan Forest Park Disaster Management Plan mentioned above is one of plans to establish a suitable Flood Forecasting and Warning System to save human life.

People passing through the Golestan Forest may be classified as (1) pure visitors to the Forest for camping and/or enjoying there, (2) passengers passing through the Forest to go a midland town of Mashad to visit a holly place of Emam Reza for lifting up their hearts, (3) passengers passing through the Forest to go Mashad for their businesses and (4) farmers and/or whole-sellers passing through the Forest to go to Mashad and/or Gorgan or other small cities and/or towns carrying agricultural products from the villages along the Madarsoo River to visit markets there to sell their selling articles.

By one account, 2,000 cars are passing through the Golestan Forest daily. Among them, damages to human life for the people belonging to the classes of (1) through (3) above are already discussed in Clause 2 above for the Golestan Forest Park Disaster Management Plan. However, damages to commercial articles belong to class (4) could not make clear their scales in monetary terms because of lack of statistical data. Anyhow, once the road in the Forest closed by flood warning announcement and/or alarming, all the vehicles cannot enter the Forest.

If it is assumed that the commercial vehicles to carry the agricultural products to markets are 20 % of the total vehicles passing through, the number of commercial vehicles may be calculated at 400 cars per day. If unit carrying capacity per car is assumed at one ton in average, around 400 tons of agricultural products should be dead stock. This is blood-and-guts matters for farmers. In other words, impertinent and/or non-systematic flood warning and/or alarming bring about serious damages to local economy.

Furthermore, one of factors to promote the Watershed Management Plan is a smooth access to markets because that the fruits, daily products and/or livestock products generated due to execute the Plan should be sold in the markets so that benefit can be returned.

From the above viewpoint, a systematic and reliable flood forecasting and warning system should be promoted to establish for entire villages, towns and cities based on the Golestan Forest Park Disaster Management Plan in this report.

Suitable Criteria for Warning to be Announced

Of course, the said Golestan Forest Park Disaster Management Plan includes criteria for warning to be announced expressed by certain rainfall. But, this is still temporary, and this criteria should be revised for the future for more making more reliable flood warning and/or alarming to prepare evacuation or to evacuate, so that people's confidence can be kept in the Government.

Development of Effective and Useful Hazard Maps

In this study, study on hazard map is made, and an actual hazard map is prepared for villagers. But this is also still temporary one because that hazardous area and/or points may be

changeable in every floods occur. Most important matters are to find "how to develop" the hazard maps and to grasp by villagers themselves.

There may be two approaches to develop effective and/or useful hazard maps. Black spot area, namely flood hazardous area may be found out scientifically, but this is needed a time and fund. Thus the Government should take this approach. Once the hazard maps are made, those are immediately delivered to the villagers, so that they grasp the hazard points. The hazard map made in this study is a good example for this purpose. The Government prepared hazard maps should be made comprehensively from the viewpoint of entire villages locating along the Madarsoo River.

The other approach is to develop by the villagers themselves. Pilot villages, Dasht and Terjenly villages, are selected in this Study, and the JICA team guides them to establish a Disaster Risk Management Committee. This is one of ideas.

Usually, the villagers better knows their territories where is hazardous and where is safe to evacuate. Thus they can make their own hazard maps including evacuation points. From this viewpoint, the JICA team guide them to make clear (1) usable properties like generators, vehicles, etc., (2) places of such usable properties so called as "Resource Mapping", (3) hazardous or risky places and safe places to evacuate with evacuation route both under the control of the said Committee as a part of "Disaster Risk Management Plan".

The Government should guide the villagers to develop such organizations to establish effective and useful their own hazard maps by themselves linking with the Government prepared hazard maps. Accordingly the villagers can grasp comprehensive concept for Disaster Risk Management.

Establishment of System for Avoidance from and/or Mitigation of Damages of Natural Disasters

As mentioned above, the Pilot Villages are selected, and JICA team guides them to select required several members for Disaster Risk Management Committees. The team also guides them to make clear (1) roles of each member, (2) peace time activities, and (3) emergency activities when disaster occurs, and (4) purposes of and preparation for activities, (5) necessary goods and equipment to be procured newly and procurement methods including funding methodology, and (6) communication networks among the Committee members and the villagers.

Development of such a Disaster Risk Management Committee is one of the ideas for avoidance from or mitigation of damages of natural disaster as floods and/or debris flow. The most important matters in developing such committees are to disseminate to whole the villages concerned, and to be linked with flood warning and/or alarming from the Government. One of ideas is recommended in a part of the Golestan Forest Park Disaster Management Plan from the comprehensive viewpoint of the villages locating along the Madarsoo River. Thus it should be referred to develop suitable systems.

Training and/or Education for Developing of the Public Awareness

During the process of activities of Disaster Risk Management, to have a public awareness of villagers of all the villages locating along the Madarsoo River is a principal matter. People and children living in the pilot villages are guided on importance of the Disaster Risk Management in meeting rooms and schools by JICA team in this study. These kinds of education should be continuously executed for the future at least once a year.

Especially, basic concept and importance of the Disaster Risk Management should be included in curriculum of schools so that people will understand the Disaster Risk Management from their childhood. And then, they will be forward to participate in the activities for actual Disaster Risk Management.

8.2 Social and Environmental Evaluation

8.2.1 Initial Environmental Examination

This social and environmental evaluation is based on the results of Initial Environmental Examination (IEE) prepared as part of Feasibility Study (F/S) on the priority projects. Generally IEE is carried out over a short period with a limited budget and use of existing data coupled with simple field surveys. Experiences of environmental specialists in similar project are also of great help. The results of IEE are attached in ANNEX 1 in this report.

Environmental Categorization

The proposed projects are classified into Category B based on output of Environmental Scoping and result of Initial Environmental Examination for the Master Plan, which revealed that all probable impacts could be mitigated by adopting proper construction methods and precautionary measures. Moreover careful examination of the projects components indicates that all are environment-friendly, contributing to sustainable utilization of natural resources and ensuring safety of inhabitants.

Relevant Laws, Regulations and Guidelines

- Article 50 of current Constitution of the Islamic Republic of Iran
- Law of Fourth Five-year Socio-economic and Cultural development Plan of the Islamic Republic of Iran, 2004
- Islamic Punishment Law (Taazirat), 2003
- Regulation Concerning the Requirement of Environmental Impact Assessment in Developmental Projects, Department of the Environment, 1994
- Environmental Guidelines and Standards, Department of the Environment, 2003
- Guidelines for Environmental Assessment of River Engineering Projects, Management and Planning Organization, 1999
- Guidelines for Environmental and Social Consideration, Japan International Cooperation Agency, 2004

To enrich the IEE, spirit of international norms, treaties and conventions, such as United Nations Conference on Environment and Development (Agenda 21 of Earth Summit, Rio, 1992) was infused into it. Principles of Japanese Official Development Assistance (ODA) were also observed.

8.2.2 Impact Evaluation

The proposed projects are:

(1) Project 1: Restoration of Breached Dam and Channel Stabilization (Erosion Control) Works in Dasht Area,

(2) Project 2: Flood Forecasting, Warning and Evacuating System for Golestan National Park, and

(3) Project 3: Publication of Flood and Debris Flow Hazard Maps.

Negative (Adverse) Impacts by Project 1

Among these three projects only Project 1 involves significant construction work, and it is obvious that any construction activity insert some negative impacts (adverse) on social, natural, and cultural environments. As movement of machinery to carry equipment and materials, as well operation of machinery to fulfill construction tasks, these activities generates noise, smoke and dust, bringing-about noise and air pollutions, as well produce vibration. As a result of construction activities, amount of soil particles in water will increase, affecting the turbidity and quality of water. Discarded oil and fuel leakage from machinery

will also cause soil contamination and land deterioration. Construction crew would generate solid waste and sewage. These wastes usually produce odor, attract insects (mosquito/parasites) and serve them as a breeding ground, thus leading to air, soil and water contaminations in the area. Natural vegetation in construction sites is removed to create space for establishment of construction camp, structures and relevant facilities, affecting the natural environment.

The noise and air pollutions could affect the health of people, particularly elderly persons and children in the area, imposing medical expenses on them. With increase in number of ill persons, number of absentees from work increases, leading to decline in production. Since most of people are farmers, if not attend the work to fulfill the farming tasks at proper time, reduction in amount of agriculture product is probable. Any decline in water quality will have effects not only to the people, but also to the livestock utilizing the water source. Human and livestock illness is a negative socio-economic impact.

Prolong noise pollution is troublesome to wildlife, particularly at mating time, when animal need comfort for successful procreation. Air pollution can wither the sensitive wild plants and suppress their normal reproduction. With less procreation and low production, population of fauna and flora in the area may decrease, inserting adverse impacts on the ecosystem.

Establishment of construction camp and mobilization of machinery for project works will alter natural atmosphere, chasing wildlife or blocking their transit in the area. With less possibility for movement, the predatory creatures will find less chance to prey, thus less food and low potential for procreation of animal.

Positive (Beneficial) Impacts by Project 1

Regarding positive impacts (beneficial) of project 1, it should be mentioned that with restoration of the breached dam, movement of soil materials will decrease. Thus sediment damage to lands and infrastructures such as road, bridge, and dam at downstream will be reduced. This will contribute in public safety, and longevity of infrastructures, offering socio-economic benefits.

If no dam, sediment is spread by water in the area, and blown up by wind in dry season, creating a dusty atmosphere with polluted air. Dust in the air not only insert negative impact on human health, but also in windy hours will cause reduction in vision of vehicle drivers leading to traffic accident and human causality.

If dam for sediment control is not established, soil materials will move to downstream and burry seedlings of natural plants and hinder their growth. With sediments control, natural vegetation finds more opportunity for growth and enhancement of natural environment. With establishment/expansion of natural vegetation, infiltration rate of land increases to promote groundwater recharge. With more availability of groundwater, deep-rooted trees will have vigor growth. Well-established plants play important role in erosion control and sediment retention, thus reducing amount of soil loss and lowering rate of land deterioration, contributing to conservation of the environment.

By fixing soil materials (sediment), no site/object of historic, cultural, or religious importance is affected downstream by particles moving with water. Since fine particles in the air (dust) could settle on such site/objects, when wind cease, less dust in atmosphere is desirable, and this can be realized through restoration of breached dam and fixation of sediment in place.

Impacts by Project 2

With availability of an accurate and efficient forecasting and warning systems, being realized through execution of project 2, people gain more confidence to stay in the area and undertake various economic activities. Further a larger number of tourists is encourage to visit the area, contributing to its economic status.

Impacts by Project 3

Project 3 is highly beneficial and efficient in enriching public knowledge on natural disasters at normal condition and saving their lives in disastrous situation. It is of preparatory, advisory and precautionary type, inform the residents on extent of flood inundation zone, and shows them proper routes for evacuating to safe places at disaster (flood) time.

At normal situation hazard map could be used as a guide for urban development and land use planning, which reflects its multipurpose nature and economic efficiency.

Overall Impacts of the projects

Each individual project results in direct and indirect impacts. Cumulative impacts are the aggregates of direct and indirect impacts, which could be negative (adverse) or positive (beneficial). Assessment of cumulative impact is important in judging the environmental soundness of the projects. Based on impact evaluation discussed above, and considering the opinion of inhabitants of the area, known during the field village surveys and through holding public consultation meeting, it can be mentioned that the priority projects formulated by JICA team, have some negative (adverse) impacts on socio-economic, natural, and cultural environment. But these impacts are temporary, mostly at construction phase, and reversible. Therefore projects are realized as environmentally sound, and socially acceptable.

8.2.3 Alternatives

After careful environmental examination and analysis of social situation, two options, namely without project (no action) and relocation of village threaten by flood disasters, were identified as discussable alternatives.

In case of without project (no action) option, the natural, socio-economic, and historic cultural environments are remained subjected to damages of disasters. While protecting entire citizens against disasters and caring for God-gifted natural resources are among tasks (actions) of the Islamic government, being opposite to “no action” option.

Relocation is an expensive, complicated undertaking not involving only technical but also legal, political (administrative), social, environmental, religious and even spiritual (emotional) issues. Because deceased persons of the village are buried in its graveyard, where the inhabitants visit weekly (usually Thursday) as a religious norm to pay respect to their beloved relatives being buried therein. With relocation this spiritual (emotional) contact will be disturbed, bringing-about an adverse impact, which could be termed as spiritual impact of the project. Since it is difficult to grasp and extent/severity of this impact for mitigation, avoiding its occurrence is much wised. Large amount of money, particularly after the 2001 Flood has been spent to furnish the village with communication road, educational, sanitary, telephone service and other social infrastructures, to meet the basic human needs. With relocation large amount of money and huge volume of energy is dissipated.

Ultimately the “with project” option is judged as rational and acceptable for realization. Thus projects formulated by JICA team are endorses for implementation. Since they suited to natural environment of the area, as well accepted by the society.

8.2.4 Impact Mitigation

Since negative impacts of project with structural measures prevail only in construction phase, and upon completion of this phase the impacts are nullified, mitigation measures/precautions should mainly be considered during the construction phase. These include:

- To dispose waste materials in designated “Dumping Sites”.
- A concrete receptacle should be constructed below ground surface for depositing used oil generated by machineries operating in construction sites. Then material is collected and disposed in suitable places in an appropriate manner.
- To avoid construction work at windy hours to minimize air pollution by dust/smoke.

- To moisten the area before starting works to reduce dispersion of dust in the area.
- Not to remove much material (sand/gravel) from riverbed for use in establishment of structures, because this may cause changes in hydro-morphology of the area.
- Some fast growing plants should be grown around the structure sites not only to replace the vegetation destroyed as a result of construction works, but also to improve the overall status of natural environment.

8.2.5 Public Consultation

The Meeting

In accordance with JICA Guidelines for Environmental and Social Considerations, 2004 and in line with international norm for project formulation, and consideration of Islamic doctrine, which encourages consultation/exchange of view in important affairs, the public consultation meeting was held with following particulars:

(1) Title: Public consultation meeting for explanation of IEE on priority projects

(2) Organizers: Counterpart personnel of Golestan and North Khorasan provincial Jihad-e-Agriculture organizations, and JICA team

(3) Venue: Field office of watershed management department of North Khorasan provincial Jihad-e-Agriculture organization, Dasht village

(4) Date/Time: 10:00-12:15, January 30 (Monday) 2006

(5) Total Number of Participant: 36 persons, comprising of members of Rural Islamic Council, village chief, farmers, livestock breeders, shop keepers and ordinary people of Daht village

(6) Speaker (in order of speaker):

- Mohamadreza PARSAMEHR, head of division for study and technical support, Golestan provincial Jihad-e-Agriculture organization
- Kenji TOYOTA, expert for structural design and cost estimate, JICA team
- Gholamhossein SHOKOHIFARD, expert for Environmental and Social Considerations, JICA team
- Kanehiro MORISHITA, Leader of JICA team

Sequence of Presentation

(1) Opening Speech by the Counterpart

At the beginning of meeting, Mr. Parsamehr welcomed the participants, briefly explained objective of the meeting, and introduced members of JICA team to the people.

(2) Presentation of the Project Outline

Mr. Toyota explained outline of projects with structural measures through an interpreter. By showing some slides he indicated layout of structural measures proposed in the JICA Master Plan, and as well explained the criteria for selecting priority projects for conducting Feasibility Study on them.

(3) Presentation of the IEE Results

Mr. Shokohifard presented outcome of IEE conducted on priority projects. Although he showed his slide with English writing, he explained them directly in Persian (Farsi), as a native member of JICA team.

Summery of Discussion

After the presentation, question and answer session begun, with the question from participants. Since most of the questions and issues raised in the meeting were more or less similar, of which only significant ones are listed below. In parallel, JICA team together with counterparts from Golestan and North Khorasan provincial Jihad-e-Agriculture organizations answered the question and provided more details to participants. They are as briefed below.

Q1: Past floods imposed economic and psychological damage to people, and now almost every year they have floods. In this context they asked how JICA projects could efficiently protect them against disasters.

A1: After the 2001 Flood a polder dike has been constructed to protect the village against floods, it is a good structure and for the time being it will serve the purpose.

Q2: Realization of long term and important projects proposed by JICA team will take about 20 years, while they are frequently threatened by disasters. Therefore they requested for early implementation of such projects, which guaranteed their safety.

A2: The target year for the projects is 2025, and the villagers consider it too long period. Therefore besides large and long term projects, the team also proposed some urgent ones among the entire projects to immediately increase the safety of people against floods.

Q3: JICA team explained construction of a small dam for sediment control, but the villagers think a relatively larger multipurpose (sediment control and water storage) dam is more beneficial to the village.

A3: The villagers requested to have big and strong (concrete) structures, but formulation of any project involves technical/engineering, economic/financial, and environmental aspects. It means project from technical, economic and environmental viewpoints must be evaluated, if judged rational, for the endorsement of implementation. In addition, JICA team also considers large dam planning at the mouth of gorge in the Gelman Darreh River.

Q4: The villagers are mostly farmers, depending on arable lands for livelihood. Construction of structures can affect some parts of their agricultural lands. The project shall consider proper compensation for the affected lands. Structural design (canal, dam) with least impact on agricultural lands is more appreciated.

A4: At the time of implementation, if the project affects the agricultural lands, the proponents certainly will negotiate compensation matter with the villagers to reach an agreement.

Q5: The dam in Ghiz Ghaleh sub-basin, which was breached by the 2001 Flood, was an earth dam. It means earth dam is not suitable for such a susceptible site. Thus they request to construct a concrete dam with proper spillway, rather than an earth dam.

A5: The team explained the hydrological design process was very much improved under JICA team activities. Spillway of the breached dam was designed on the basis of unreliable and small rainfall. But hydrological designing process was already improved so that the design discharge will be computed much more reasonably and reliably. As a result, even though the earth dam type is selected for rehabilitation, the dam shall be equipped with the proper spillway.

Q6: In designing canal or any other water diversion/conveyance facilities, careful attention shall be paid to distribution of our agricultural lands, because they expect least disturbance of their land and farming activities by the projects.

A6: Final design of proposed canal/water conveyance facilities depends on realization of projects formulated by Iranian sides. If they implement those projects, then our design should be reviewed and updated to mach the situation.

Results of the Meeting

After the meeting, JICA team and counterparts from Golestan and North Khorasan provincial Jihad-e-Agriculture organizations, had a small meeting to extract the essence of the public consultation meeting. After some discussion they collectively agreed on following points:

- In general, people in the area are interested in the JICA projects and wish for their early realization.
- However some of them are anxious about fate of agricultural land, which could be affected as a consequence of construction of structures, but disagree with no action and relocation of village alternatives.
- They recognized the importance of projects of flood warning and hazard map for evacuation during the disaster, as well as their merit in normal time.
- Project for stabilization of riverbank was attractive to them, since further expansion of gully may lead to land deterioration.
- They suggested construction of large reservoir dam, because they like to have irrigated agriculture, and thereby more income.
- They understood the negative (adverse) and positive (beneficial) impacts of the projects, and felt with project alternative is rational.

8.2.6 Conclusions and Recommendations

Conclusions

Based on above mentioned explanation and discussions and referring to available document and evidences, it is concluded that none of the projects formulated by JICA team require further full-scale EIA. Thus they are endorsed for implementation, with condition that the proponent/executors pay attention to following recommendations and fully observe them. This conclusion is in line with environmental guidelines published by DOE, as well as guidelines of JICA, which state projects with environmental category B, and of watershed management nature are considered as environment-friendly, thus requiring no EIA.

With project alternative was realized much environmentally sound and socially acceptable, as compared to without project (no action), and relocation of village, thus endorsed for execution.

Iran is included in world's 10-top disastrous countries, as 70% of the country is prone to earthquake, and 50% to floods. In total 90% of population is subjected to cumulative disasters of natural events (earthquake and floods), making the statesmen unable/unsuccessful in disaster management task. Furthermore in this fragile circumstance the status/responsibility of people in disaster management/mitigation is not defined. Therefore systematic and realistic disaster management/mitigation approaches need to be established, involving coordination of state agencies and participation of local people. The captioned project could pave foundation for such activities, and serve as a road map to conservation and enhancement of socio-economic, natural, and cultural environments in the country over a long time period.

Recommendations

(1) Knowledgeable and experienced environmental specialists shall be involved in all activities of the projects to receive their suggestion and advices as activities in consistency with environmental management and monitoring.

(2) In case of any abnormality, the contractors and villagers shall immediately inform the relevant organization/institutes and seek their advice and assist in solving the problem.

(3) Participation of local people, collaboration of governmental agencies and provincial governments shall be encouraged for realizing the project.

(4) The local people shall be engaged in construction works as much as possible, to create job in the area, and thereby gain continuous public support for the project.

(5) According to regulation of Cultural Heritage and Tourism Organization, any construction activity/material must be at least 50 m away from site of cultural, historical and religious importance. Project is strongly recommended to follow this instruction, as well quickly contact to the nearest organization, whenever face any strange object.

CHAPTER 9 CONCLUSIONS

As described in Chapter 1, three master plan components were selected as the priority projects for urgent implementation. These are (1) river restoration plan in Dasht area, (2) Golestan Forest Park disaster management plan, and (3) flood preparedness plan. Viability on these priority projects was verified in the feasibility study. Brief summery is described below.

(1) River Restoration Plan in Dasht Area

Proposed river restoration plan is composed of two components, namely sediment control dam and river stabilization works.

Sediment control dam is planned to rehabilitate the earth dam breached in the 2001 Flood, to consolidate the stored sediment in the basin of the earth dam, and to stabilize the lower part of the Ghyz Ghaleh River channel. Through comparative study among dam type and location of floodway, earth dam type with floodway on the left bank was selected as optimum plan. The construction cost was estimated at 12,060 million Rials.

Meanwhile, river stabilization works is planned to consolidate the valley-head erosion downstream of Dasht village, to stabilize the both sides' channel of the structure, and to protect the farmland from progressive gulley erosion. Through comparative study among concrete dam type and hydraulic drop structure type, concrete dam and hydraulic drop of a compromise type was selected as optimum plan. The construction cost was estimated at 11,890 million Rials.

Implementation of construction in both works is planned for about two and half years. From the economic viewpoints, the EIRR (economic internal rate of return) shows 18.7 % under the present conditions and 19.2 % under the future (year 2025) conditions. These figures mean the projects have high economic viability.

From the environmental and social viewpoints, the identified negative impacts are temporary, mostly at construction phase, and reversible. Thus these projects are recognized as socially acceptable.

(2) Golestan Forest Park Disaster Management Plan

In the past two floods, 2001 and 2002, casualties concentrated in the Golestan Forest Park, and most of them were visitors and tourists. In order to save their lives from disastrous floods, early and reliable flood forecasting and warning system is indispensable.

The study point aimed at was how to improve the present situation of flood forecasting and warning system including meteo-hydrological observation network. The alternatives were derived from the three conceptual improvement; namely, (1) manual system, (2) semi-automatic system, and (3) full-scale automatic system. Comparative study sought best combination of data collection, processing and warning sub-systems among the above improvement steps. Finally optimum combination was selected as semi-automatic data collection, full-scale automatic data processing, and manual warning system.

The installation cost was estimated at 4,282 million Rials, and system installation work required about 2 years. From the economic viewpoints, the EIRR shows 7.2 % under the present conditions and 13.7 % under the future (year 2025) conditions. These figures mean the project has high economic viability. From the environmental and social viewpoints, the project is recognized as environmentally sound and socially acceptable since construction works are limited in a few spots and minimal.

(3) Flood Preparedness Plan

Flood preparedness is a generic term including activities on knowledge building, training on evacuation and rescue assuming disaster situations, improvement of disaster management units at community level. In the course of the feasibility study, JICA team prepared hazard

map and issued newsletter containing hazard map and evacuation route. On the other hand the team conducted a series of workshops in Terjenly and Dasht villages selected for pilot activities.

Good combination with structural measures and non-structural measures could realize safer situation in the river basin from flood disasters. The first project, river restoration, is purely one of the structural measures. The second one, Golestan Forest disaster management, is likely in between both measures. The third one, flood preparedness, is purely one of the non-structural measures. Thus such combination between top-down measures (structural measures) and bottom-up measures (non-structural or community-based measures) could produce the most effective management frame against flood disaster, as a whole.

ANNEX I

Initial Environmental Examination

for the Priority Project

ANNEX 1

INITIAL ENVIRONMENTAL EXAMINATION FOR THE PRIORITY PROJECT

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CHAPTER 1 GENERALITIES

1.1 Introduction

This Initial Environmental Examination (IEE) has been prepared as part of Feasibility Study (F/S) conducted by Japan International Cooperation Agency (JICA) Study Team on the priority projects.

Initial Environmental Examination (IEE) refers to initial examination for estimating probable environmental impacts in order to ascertain whether a full-scale examination of impacts, i.e., an Environmental Impact Assessment (EIA) is required or not. Generally IEE is carried out over a short period with a limited budget and use of existing data coupled with simple field surveys. Experiences of environmental specialists in similar project are also of great help.

Major components of IEE include identification of project outline and of site environmental conditions (project explanation and site description), preliminary assessment of project's environmental impacts, and evaluation whether Environmental Impact Assessment (EIA) is required for the project or not. Environmental impact refers to effect of project on natural (air, water, soil, vegetation, wildlife), social-economic (population, economic activities, income, employment, institution, infrastructures), and cultural (historical/cultural asset) environments. As a basic concept, both negative (adverse) and positive (beneficial) impacts are identified and evaluated. A project with no/least negative impact on natural, socio-economic, and cultural environments, or with reversible impact, is environmentally rational, thus can be implemented.

The IEE describe herein was conducted to determine the environmental soundness of the priority projects proposed by JICA team for Feasibility Study, in Madarsoo River Basin. Details of priority projects are provided in fore-coming sections.

Project title: The Study on Flood and Debris Flow in the Caspian Coastal Area Focusing on the Flood-Hit Region in Golestan Province in the Islamic Republic of Iran

Project proponent: Deputy for Watershed Management, Forest, Range and Watershed Management Organization, Ministry of Jihad-e-Agriculture, Islamic Republic of Iran

1.2 Environmental Categorization

Category: B

Reason:

The project is classified into Category B based on output of Environmental Scoping and result of Initial Environmental Examination for the Master Plan, which revealed that all probable impacts could be mitigated by adopting proper construction methods and precautionary measures. Moreover careful examination of the projects components indicates that all are environment-friendly, contributing to sustainable utilization of natural resources and ensuring safety of inhabitants.

1.3 Relevant Laws, Regulations and Guidelines

- Article 50 of current Constitution of the Islamic Republic of Iran
- Law of Fourth Five-year Socio-economic and Cultural development Plan of the Islamic Republic of Iran, 2004
- Islamic Punishment Law (Taazirat), 2003
- Regulation Concerning the Requirement of Environmental Impact Assessment in Developmental Projects, Department of the Environment, 1994

- Environmental Guidelines and Standards, Department of the Environment, 2003
- Guidelines for Environmental Assessment of River Engineering Projects, Management and Planning Organization, 1999
- Guidelines for Environmental and Social Consideration, Japan International Cooperation Agency, 2004

To enrich the IEE, spirit of international norms, treaties and conventions, such as United Nations Conference on Environment and Development (Agenda 21 of Earth Summit, Rio, 1992) was infused into it. Principles of Japanese Official Development Assistance (ODA) were also observed.

1.4 Aims of IEE for the Priority Projects

In principle the IEE aimed to:

(1) Describe present conditions of sites of the priority projects,

(2) Present outline of the projects,

(3) Predict/assess potential environmental impacts (adverse and beneficial) of the projects,

(4) Provide measures/guidance for mitigating adverse impacts and enhancing the beneficial impacts of the projects, and

(5) Hold public consultation meetings to disclose the project information and encourage people participation in project activities.

The above issues enumerated in (5) are emphasized by JICA to ensure transparency and accountability, as well as to solicit active participation of local people in project activities, through which sustainability of development is guaranteed.

1.5 Purpose of the Projects

(1) Consolidate sediment in river channel, particularly in a upper stretch of Dasht village, to retard its spread and reduce its damages to rangeland, farmland, and infrastructures downstream, through restoration of dam breached by the 2001 Flood,

(2) Bring about increment in groundwater recharge through delay in flood passage and water-holding phenomena of sediment,

(3) Stabilize the riverbank along the Madarsoo, downstream of Dasht village, to reduce soil erosion and land degradation,

(4) Provide timely disaster warning to people and urge them to leave the area, thereby saving public lives and movable assets,

(5) Distribute hazard maps to people and relief agencies, showing them the proper routes for reaching to safer places, when disaster occurs.

CHAPTER 2 DESCRIPTION OF THE PROJECTS SITES

2.1 Background

Among the projects formulated by JICA Study Team through the Master Plan Study, three projects were prioritized based on their urgent needs for implementation. As a part of Feasibility Study on these priority projects, this Initial Environmental Examination (IEE) was conducted to justify the environmental soundness of the projects and clarify their overall merits for the area. The priority projects are of two categories; here refer to projects with structural measures and projects with non-structural measures, which are explained in detail in the next section under title of Description of the Projects. The projects will be implemented in different sub-basins of the Madarsoo River basin, each having its own particular characteristics, as outlined below.

2.1.1 Overview of Entire Madarsoo River Basin

Detailed information and data for entire Madarsoo River basin are provided in JICA Interim Report (master plan), 2005 (particularly in IEE report for master plan). Once again overview of pronounced features of the basin is provided hereunder, to contribute in better understanding of situation of sites designated for the priority projects.

From topographical viewpoints the Madarsoo River basin is categorized into three parts, as mentioned below and shown in Fig. 2.1.

(1) Mountain and Highland Area of Headwaters

This area encompasses the rangelands and farmlands in which mostly dry farming is practiced. Due to over-grazing, the vegetation cover is poor, and soil erosion by gullies and rills occurs all over the headwaters. Such erosion in the headwaters results in accelerating disastrous force during floods by supplying eroded soils and debris to the downstream areas.

(2) Steep Valley of Middle Reaches

The river channel in middle reaches is the steepest part over the entire stretch of the Madarsoo River. Arterial road connecting to Mashhad and the river course cross each other frequently in the reaches. Under such situations floodwater may destroy the related structures, bridges and road embankment. Furthermore, people visiting the Golestan National park may encounter the disaster of floods, particularly in tourist season (July-August).

(3) Alluvial Plain and Hills of Lower Reaches

In the lower reaches, agricultural land extends over the floodplains, and villages scatter along the river course.

The river channel of the Madarsoo mainstream is steep with a slope ranging from 1/50 (2 %) to 1/150 (0.7%) as illustrated in Fig. 2.2. In particular the channel of middle reaches, which are located in the Golestan Forest National Park, is the steepest portion along the mainstream. In the 2001 Flood, disastrous floodwater washed away hundreds tourists and campers who visited to the national park, and finally killed two hundreds of them.

2.1.2 Description of Sites for Priority Projects

Projects with structural measures are for headwaters, encompassing the Ghiz Ghaleh, Dasht-e-Sheikh and Gelman Darreh sub-basins (Fig 2.3). Characteristics of rivers (tributaries of the Madarsoo River) running in these sub-basins are simplified herein.

Table 2.1 Major Tributaries in the Upper Reaches

Sub-basin	River length (km)	Catchment area (km^2)	Average slope
Ghiz Ghaleh	28	126	2.7
Dasht Sheikh	18	125	3.9
Gelman Darreh	70	787	1.7

Source: Interim Report (Master Plan), JICA Study Team, 2005

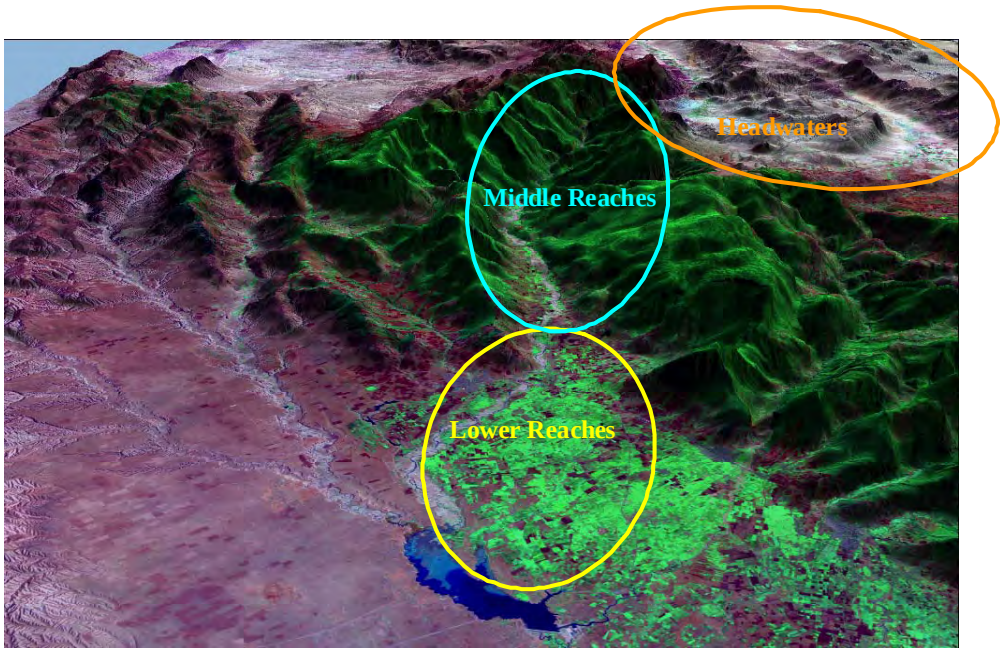

Fig. 2.1 Satellite Image of Madarsoo River Basin with Topographic Categorization

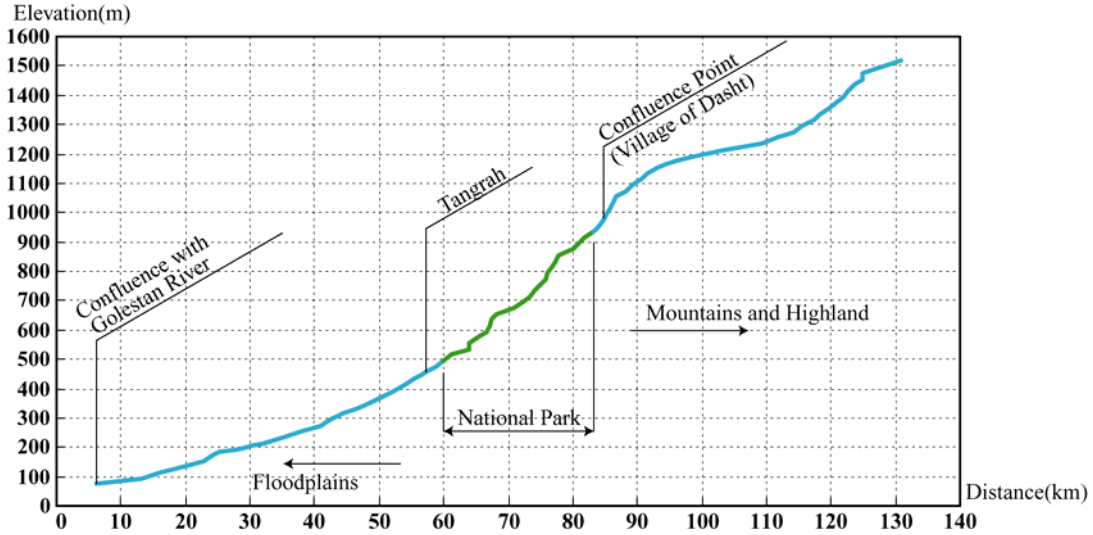

Fig. 2.2 Longitudinal Profile of the Madarsoo Mainstream

2.2 Ghiz Ghaleh Sub-basin

The Ghiz Ghaleh sub-basin with an area of 126 km^2 is suited in administrative boundary of Semnan and Khorasan provinces. About 50 % of the area of this sub-basin occurs in Golestan National Park, which is under authority of Department of the Environment of Iran (DOE).

Climate Setting

Average annual rainfall is about 305 mm, mean annual temperature is 10.7 ℃, and climate is of cool semi-dry type. Average elevation is 1600 m, and average slope is 16.8 % with an east-west direction. Drain-ability of the basin ranges from moderate to very good.

Geology

The geology of Ghiz Ghaleh sub-basin is comprised of sediments and rocks belonging to Pre-Cambrian, Jurassic, Cretaceous, and Quaternary periods. The materials consist of limestone, shale, quartz, marl, conglomerate, and loess.

Geomorphology

Major landforms in this sub-basin are Mountain, Hill, and Terraces. The terraces are mainly composed of loess materials apparently transported by wind and deposited in the area.

Soil and Land

Most of soils are deep to moderately deep, medium texture, having high percentage of gravel and stone with rock outcrops in some localities. Most of soils are sandy loam, sandy clay and silt occurring on step slopes. Although most of lands are under natural vegetation (rangeland and forest) as well used for cultivation, they have limitation such as steep slope, high % of gravel and stone, rock outcrop, erosion, and undulation, which reduce their productivity, and affect their suitability for large-scale agriculture.

Erosion

Major forms of erosion are sheet, rill, bank, channel, and gully. In some localities sign of landslide is also seen. Channel and sheet erosion are the most common form.

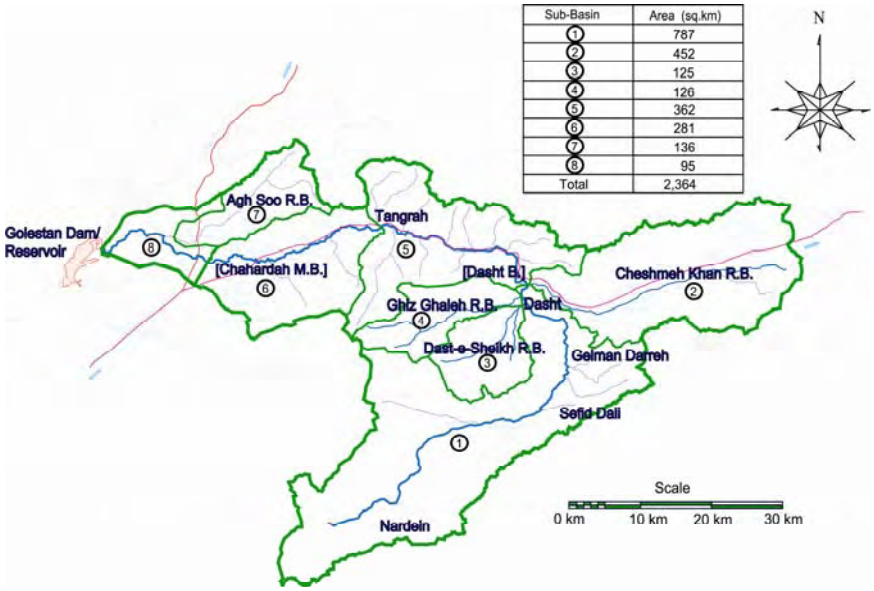

Fig. 2.3 Madarsoo River Basin with its Sub-basins

Land Cover

Natural vegetation in low elevation areas is mainly comprised of shrubs (Artemisia) and grasses (Stipa), while in high elevation Quercus (oak) and Juniperus (Juniper) trees are seen. Information for natural vegetation and land cover of Ghiz Ghaleh basin is given in Table 2.2.

Table 2.2 Land Cover of Ghiz Ghaleh Sub-basin

Type	Cover	Area (ha)	% of Total Area	Remarks
Meadow	Cynadon + Carex	202	1.6	
Bush-land	Artemisia + Stipa	5,972	47.4	
Rangeland	Festuca + Stipa	806	6.4	
Woodland	Juniperus + Artemisia	415	3.3	Most part protected
Forest	Quercus + Carpinus	1777	14.1	Most part protected
Cultivation	Wheat, barley, and sunflower	2873	22.8	
Rock-outcrop	Limestone, sandstone, conglomerate	328	2.6	
Others	Villages + bare lands	227	1.8	Include infrastructures
Total		12600	100	

Sources: Report of Ghiz Ghaleh Basin, Golestan Provincial Jihad-e-Agriculture Organization- 2003
Interim Report (master plan), JICA Study Team- 2005

Wildlife

Some of animals usually roaming in the basin are bear, wild sheep, wild goat, rabbit, rate, porcupine and sable. Birds such as partridge, eagle, falcon and pigeon, as well reptiles such as snake and scorpion are commonly seen in the area.

Cultural/Historical/Religious Site

Ghiz Ghaleh castle of historical value exists in this sub-basin, but is far from construction site, thus implementation of the projects has not any impact on it.

Socio-economy

Total number of households in this sub-basin is 293, having a population of 1,422 inhabitants, who live in Dasht Shad village. Population density in the area is 10.6 persons/km^2. Male to female ratio is 0.95, means 95 males against 100 females. About 92% of population is able to read and write, and literacy rate for male and female is 95% and 89%, respectively. Average annual population growth rate is about at 1.5%.

Main infrastructures in the area are primary and secondary schools, mosque, medical clinic, sanitary office, telephone office and library. It should be noted that lives of inhabitants are not directly subjected to flood disaster, but large flood damages their farmland, as did the flood in 2001.

2.3 Dasht-e-Sheikh Sub-basin

The Dasht-e-Sheik sub-basin with an area of 125 km^2 occurs in Khorasan province, and has the following characteristics:

Climate Setting

Average annual rainfall is about 256 mm, mean annual temperature is 11.6 ℃, and climate is of cool semi-dry type. Average elevation is 1,327 m, and average slope is 14.1 % with north direction. Drain-ability of the basin is good so that one permanent and several seasonal springs exist in this area.

Geology

The geology of the sub-basin is composed of limestone, sandstone, shale, marl, conglomerate and loess, belonging to Jurassic, Cretaceous, and Quaternary periods.

Geo-morphology

Major landforms in the sub-basin are Mountain, Hill, Upper terraces and Floodplain.

Soil and land

Most of soils are shallow to moderately deep, medium to heavy texture, and having high percentage of gravel and sand. Soils occurring on moderate to steep slopes contain high percentage of silt and sand, and low amount of organic matter. Lands on elevated areas are usually under natural vegetation (rangeland), while dry farming and irrigated agriculture are commonly practiced on terraces and in floodplains.

Erosion

Main forms of erosion in this sub-basin are sheet, rill and gully erosion.

Land cover

Land cover of the sub-basin is simplified in Table 2.3 below.

Table 2.3 Land Cover of Dasht-e-Sheikh Sub-basin

Type	Area (ha)	% of Total	Remark
Halophyte	346	2.7	
Shrub-land	8,877	71.1	Mostly of Artemisia species
Bush-land	314	2.5	
Grassland	168	1.3	
Cultivation	3,226	18.6	Some portion irrigated
Others	469	3.8	Residential area and bare lands
Total	12,500	100.0	

Sources: Report of Dasht-e-Sheikh Basin, Golestan Provincial Jihad-e-Agriculture Organization- 2003
Interim Report (master plan), JICA Study Team- 2005

Wildlife

Animal such as wild pig, bear, wolf, jackal, fox, rabbit, rate, and snake, as well birds such as pigeon and partridge are commonly seen in the area.

Cultural/Historical/Religious Site

Mausoleum of Imam Zadeh Daniel of religious, historical and cultural values exists in the sub-basin, but is far from construction site, thus implementation of the projects has no impact on it.

Socio-economy

Two villages of Dasht and Bidak are in the sub-basin, with total household number of 377, and total population of 1,523 inhabitants. Population density in the area is 12.5 persons/km^2.

Male to female ratio is 1.2, means for each 120 male there are 100 females. About 90 % of the population can read and write, and literacy rate for male and female is 81 % and 78 %, respectively. Widely available infrastructure/public facilities are primary, secondary and high schools, medical clinic, sanitary office, telephone office, common bath, mosque, playground, sundry shop, and bakery.

2.4 Gelman Darreh Sub-basin

The Gelman Darreh sub-basin has an area of 787 km^2 and occurs in Semnan, Khorasan and Golestan provinces. Its main characteristics are as follows:

Climate and setting

Average annual rainfall is about 264 mm, mean annual temperature is 11.4 ℃, and climate is of cool semi-dry type. Average elevation is 1549 m above sea level, and average slope is 16.6% with northwest direction. Overall drain-ability of the basin is good so that five springs with low yield, one Kanat, and many wells exist in this area.

Geology

The geological formations in the sub-basin are comprised of materials such shale, dolomite, marl, limestone and conglomerate belonging to Pre-Cambrian, Jurassic, Cretaceous and Quaternary periods.

Geomorphology

Landform of the sub-basin consists of Mountain, Hill, Upper Terraces and Plateaux, Piedmont Plain, and Alluvial-Colluvial Fans. Terraces generally consist of well-sorted silt and sand, having a thickness of more than ten meters.

Soil and land

Major soils in the sub-basin are Lithic Xerorthents, Typic Xerorthents, Typic Haploxerepts, and Typic Calcixerepts, mostly being shallow, gravelly with rock outcrops and susceptibility to erosion. In localities with low permeability some salinity has occurred. In general, lands with high elevation are left under natural vegetation (rangeland and woodland), but those with low elevation are used for cultivation of cereal and fruit crops.

Erosion

Major forms of erosion in the sub-basin are sheet, rill, bank, channel, gully and badlands. Sheet erosion is usually occurs in irrigated lands.

Land cover

Major part of the sub-basin is cover by natural vegetation (rangeland), which provides forage to large number of livestock coming to the area for grazing. While woodland offer shelter and feed to wildlife inhabiting or transiting in the area. Land cover is simplified in Table 2.4.

Table 2.4 Land Cover of Gelman Darreh Sub-basin

Type	Cover	Area (ha)	% of total area	Remarks
Rangeland	Artmisia + Stipa	17,578	22.3	
Woodland	Juniperus + Artemisia	3,093	3.9	
Farmland	Wheat, barley, sunflower, sugar beet	6,084	7.7	Some portion irrigated
Orchard	Apricot, plum, cherry	45	0.1	Usually grown mixed
Bare-land/ Others	Shelter for human and pen for livestock	51900	66.0	Livestock breeders stay for few months
Total		787,00	100.0	

Sources: Report of Gelman Darreh Basin, Golestan Provincial Jihad-e-Agriculture Organization- 2004
Interim Report (master plan), JICA Study Team- 2005

Wildlife

Animal such as boar, bear, wolf, jackal, fox, rabbit, rate, snake, scorpion, as well birds such as pigeon and partridge are commonly seen in the area.

Cultural/Historical/Religious Site

No site of cultural, historical or religious value was identified in the sub-basin.

Socio-economy

At present no well-defined village is recognized in the sub-basin. But there are two sites, namely Safid Dali and Gelman Darreh, where livestock breeders and farmers erect some shelters in which they (usually men) stay for few months to perform their jobs. In winter only few persons (watchmen) are in the area, while in summer when families unit, population increase to a few ten persons. In winter of 2004 there were only 2 watchmen in these shelters, but increase to 59 persons in next summer.

Since this sub-basin has no permanent inhabitant, no public infrastructure exists therein.

Livestock being raised by breeders are sheep (90 %), goat (9 %), and cow/others (1 %). In fact the most of livestock belong to people in adjoining areas, such as Dasht, Cheshmeh Khan, and Haghol Khajeh villages, but mainly depend on the sub-basin for forage and feed.

Major crops produced by farmers are wheat, barley, sunflower, and sugar beet, which are partially irrigated by Kanat water through traditional (gravity/flood irrigation) practice. In general average yield of crops produced in the sub-basin is higher than that of national average. However area under orchard is not much, but its overall production stand at 5 tons/ha, which contribute to annual income of farmers, as well generate some feed for livestock. Farmers usually apply tractor and other machinery as well use fertilizer and pesticide to increase farming efficiency and produce higher yield.

2.5 Golestan Forest National Park

Golestan national park is the first national park in Iran, and one of the largest and important parks in the world. This park is under authority of DOE of Iran, and has been registered by International Union for Conservation of Nature (IUCN) as a national park of management category II, as well recognized by United Nations Educational, Scientific and Cultural Organization (UNESCO) as part of international network of Biosphere Reserve with management category IX.

Total area of the park is about 92,000 ha, of which 30% is in the Madarsoo River basin designated for being study by JICA team. According to the documents published by DOE, 150 species of birds, 69 species of mammals, 49 species of reptiles, 5 species of amphibians, and 8 species of fishes are seen in the park.

Plants such as Quercus, Carpinus, and Zelkova; mammals such as large Iranian deer, ram, leopard, ewe, as well birds such as partridge, falcon, quail, starling are seen in the park. Some endangered, rare and vulnerable fauna and flora species exist in this park, which are of biodiversity, education, scientific, and exploratory importance, thus being under particular attention/protection of DOE.

In general there is no any well-defined village or large infrastructure in that part of park being study by JICA team, but there are some shelters for guardsmen/employees of park, and several localities furnished with simple facilities for camper/researchers who stay for some days for recreation/research purposes. Total number of such visitors is estimated at about 7,800 persons per year.

An asphalt road known as Tehran-Mashhad road passes through the park, linking Tehran, as well some cities of Caspian coastal area to sacred place of Shiite Muslim, Mashhad city. Peak traffic density of road under normal condition is estimated at 25,000 automobile units/day. In the park road runs parallel to the Madarsoo River and in some localities it goes through narrow passages (valleys), which increases risk of damage to trafficker in case of flood occurrence.

2.6 Floodplain in the Lower Reaches

Sub-basins extend at lower reaches of the Madarsoo basin, encompassing floodplain, which covers vast agricultural lands and houses scattered villages along the river course.

Although the lower terraces in the floodplain is subjected to frequent flood/submergence with high risk for loss of properties and lives, fertile soils and availability of water for farming have encouraged the people to undertake agriculture/livestock raising activities. From geological viewpoint the plain is composed of unconsolidated deposits mostly consist of silt, sand and gravel with an average thickness of about 50 meters. Its slope ranges between 0 to 3%, depending on situation of terrains. Soils are of heavy to very heavy texture and largely under irrigated crops such as rice, cotton, wheat, and some vegetables.

CHAPTER 3 DESCRIPTION OF THE PROJECTS

Among the projects formulated by JICA Study Team, through conducting Master Plan Study, three projects have been selected as the Priority Projects, based on their urgency/efficiency for retarding spread of sediment/expansion of erosion, as well as reducing lives (human and livestock) causalities. Outlines of these priority projects are given here.

3.1 Restoration of Breached Dam and Channel Stabilization Works

In 1980s the Natural Resources General Office of the Ministry of Jihad-e-Agriculture (former Ministry of Agriculture) constructed an earth dam in Ghiz Ghaleh sub-basin about 4.5 km upstream of Dasht village. This dam contributed in watershed conservation and provided benefits to inhabitants and wildlife in the area through:

- Sediment control,
- Retention of surface runoff and thereby recharge of groundwater,
- Provision of drinking water to domestic livestock and wildlife,
- Provision of water to nurseries/banquette cut in its vicinity, and
- Contribution in flood control.

But the huge flood in 2001 breached the dam and damaged its spillway, leaving it malfunction with a large amount of sediment in and around of its site.

The Dam had been founded on hard rock at right bank, on sand and gravel layers at middle and on debris accumulation at left bank. The dam was constructed with earth fill. Spillway was provided at left bank with excavated channel. At right bank was provided with excavated channel for intake to supply water for banquette cut on hillside.

At field survey time in November 2004, there were many traces of erosion along the top of dam, which suggested that floodwater had flowed over the top of dam body. The dam was widely opened at the boundary of foundation between rock and riverbed materials. Sediment accumulated in reservoir is vulnerable and could be transported downstream by floodwater. Fig. 3.1 shows situation of the breached dam.

Causes of the dam breached were supposed to be as followings:

(1) Overtopping of Floodwater

Being caused by shortage of spillway capacity, which was forced by blocking of plant trunks and sediment flashed out from the valley located at the entrance of the spillway, or by the design capacity itself.

(2) Piping through the Embankment or Riverbed

Most probably this phenomena has also played a role in destruction of the dam.

As a consequence of the same flood, at a susceptible location about 2.5 km downstream of Dasht village, bank of the Madarsoo River were heavily washout and huge gullies were created. Fig. 3.2 shows situation of susceptible location after the 2001 Flood. However it has worsened now, and quick action for rehabilitation is necessary.

If the breached dam is not restored in place, and riverbanks are not stabilized at susceptible location, movement of sediment to downstream, and expansion of gullies will become terrible. In due attention to this fact, JICA study team has prioritized this project, and urges it realization at an early time. Under this project breached dam will be restored, and riverbanks stabilized by applying structural measures, well standard criteria, and proper design.

Fig. 3.1 Breached Dam in the Ghiz Ghaleh Sub-basin Upstream of Dasht Village

Fig. 3.2 Madarsoo River Bank Downstream of Dasht Village

3.2 Flood Forecasting, Warning and Evacuating System for Golestan National Park

This project for establishment of flood forecasting and warning system aims at minimization of flood causalities and damages to people transiting/camping in the area. The system is comprised of telemetry, transmission and warning instrument/devices, being installed at suitable points in accordance with needs and appropriateness for information dissemination. Because the system is established to disseminate reliable early flood warning to the people and encouraging them to evacuate, entrance and exist sides of park have been recognized as rational points for installation of the instrument/devices. In order to reduce volume of the construction works, and lessen economic burden on proponents, this project would utilize the existing equipment and facilities as much as possible. At normal time the system would supply climatic data/information to its center for being used in weather broadcasting, according to which the campers may plan/arrange their visit to the area.

Initially a center for this system is established at water resources department of Mazandaran-Golestan Regional Water Board in Gorgan, which would process the data and transfer flood related information to Provincial Disaster Management Center for being announce to relevant agencies in the form of flood warning and evacuation order. Upon receiving such message, the police shall close the entrance of park at both sides, with patrol car asking people to leave the area.

3.3 Publication of Flood and Debris Flow Hazard Maps

This project aims to produce and publish a hazard map, which will be effective in disaster management, since it indicates spatial risk distribution of disaster. Under this projects, reliable information/data on topography, geomorphology, geology, meteo-hydrology, and historical records are justified and used to identified and delineate hazardous areas through application of Geographic Information Systems (GIS). The furnished hazard map in general contains information on the probable extent of flood inundation, and the evacuation route and sites to be taken during floods. Upon completion it will be printed in bulk quantities and distributed among people in hazardous locations, as well as among institution/organizations dealing with disaster management in the area (including non-governmental organization/relief agencies).

Basically this project is of preparatory, advisory and precautionary type, involving non-structural measures, but efficient in enriching public knowledge on natural disasters at normal condition and saving their lives in disastrous situation. It also matches efforts of State Corp of Unexpected Events, which disseminate materials to promote public knowledge/ understanding on disaster and prepare them for coping with crises of unexpected events.

CHAPTER 4 IMPACT EVALUATION

4.1 Environmental Impacts of Project with Structural Measures

The project with structural measures involves construction works for restoration of the breached dam, as well for stabilization of riverbank. Since construction activities of both cases are more or less similar, their overall impacts (adverse and beneficial) are collectively discussed herein.

4.1.1 Negative (Adverse) Impacts

Construction Phase

It is obvious that any construction activity inserts some adverse impacts on natural, social and cultural environment. These impacts will originate from the various construction activities: movement of machinery to carry equipment and materials, operation of machinery to fulfill construction tasks, generation of noise, smoke and dust, bringing-about noise and air pollutions, and production of vibration.

As a results of construction activities, amount of soil particles in water will increases, affecting the turbidity and quality of water. Discarded oil and fuel leakage from machinery will also cause soil contamination and land deterioration

A camp termed as construction camp is to be set in vicinity of the construction sites for the project employees, including guard/watchman. People residing in these camps would generate solid waste and sewage. Solid wastes usually produce odor, attract insects (mosquito/parasites) and serve them as a breeding ground, thus leading to air, soil and water contaminations in the area.

Natural vegetation in construction sites is unavoidably removed to create space for establishment of construction camp, structures and relevant facilities, affecting the natural environment.

(1) Impact on Socio-economic Environment

The noise and air pollutions could affect the health of people, particularly elderly persons and children in the area, imposing medical expenses on them. With increase in number of ill persons, number of absentees from work increases, leading to decline in production. Since most of people are farmers, if not attend the work to fulfill the farming tasks at proper time, reduction in amount of agriculture product is probable.

Since the construction crew, including workers and machine operators, are directly subjected to noise and air pollution as well as vibration generated by machinery, they face more health risk, including injuries. Prolong subjection to pollution and vibration coupled with accidental injuries will threat health of the construction crew, and could cost them money for treatment and recovery.

Any decline in water quality will have not only affect the people, but also the livestock utilizing the water source. Human and livestock illness is a negative socio-economic impact. In both cases people must spends for recovery.

Solid waste generated in construction camp, if not properly collected and regularly disposed, will attract insect (mosquito/parasites) and create an unsanitary situation, being problematic to the society.

Removal of natural vegetation to create space for establishing construction camp and structures, as well as trampling of vegetation by man and machinery engaged in project works, cause reduction in greenery in the area. Since man is benefited from plants through utilization of fresh air/enjoyment of beautiful scenery, and livestock

feed on vegetation to gain weight, any reduction in vegetation density is considered as a disadvantage to socio-economic environment.

(2) Impact on Natural Environment

Prolong noise pollution is troublesome to wildlife, particularly at mating time, when animal need comfort for successful procreation. Air pollution can wither the sensitive wild plants (flowers) and suppress their normal reproduction. With less procreation and low production, population of fauna and flora in the area may decrease, inserting adverse impacts on the ecosystem.

Establishment of construction camp and mobilization of machinery for project works will alter natural atmosphere, chasing wildlife or blocking their transit in the area. With less possibility for movement, the predatory creatures will find less chance to prey, thus less food and low potential for procreation of animal. This could create an unbalanced situation in ecosystem, through alteration in population/variety of animals.

Since water sources in the area are commonly used by wildlife, any decrease in water quality would have negative impacts on health and procreation of these creatures. With decrease in water quality, population of aquatic organisms declines, deranging food chain and population pyramid in ecosystem. With decline in water quality, population of sensitive creatures, such as planktons (food source for fish/amphibian) decreases. With decrease in food source, population of fish/amphibian declines, affecting the population and reproduction ability of predatory birds, which mostly feed on aquatic creatures, such fish and amphibian.

Discarded oil and fuel leakage from machinery contaminate the soils and insert negative impacts on soil micro- and macro-organisms. Activity of microorganism highly contributes in increment of soil fertility and land productivity. Since microorganisms breakdown the litter and other decayed materials to generate some nutrients, which are absorbed by plants for attaining vigor growth. Earthworm, beetle, and other soil macro-organisms play important roles in removal of soil compaction and increment in land infiltration rate, thus creating favorable condition for plant growth, on which wildlife feeds. With soil this beneficial cycle is interrupted, leading to deterioration in environmental status of the area.

Insects attracted by solid waste, may multiply their population and establish themselves in the area as plant/animal parasites, threatening the health and beauty of natural elements.

Natural vegetation in construction sites is unavoidably removed to create space for establishment of construction camp, structures and relevant facilities, affecting the natural environment. Since most wild animals feed on natural plants, with decrease in plant density wildlife will suffer.

(3) Impact on Cultural Environment

Since there is no any site/object of historic, cultural or religious importance immediately near the construction sites, thus project has no any direct negative impacts on cultural environment. But if soil particles (sediment) is not fixed in place, they may blown up by wind, get suspended in the air and travel a long distance, and finally settle on cultural assets, inserting negative impacts on them.

Operation/Maintenance Phase

The structures established for sediment control and stabilization of riverbank, involve no specific operation/maintenance works, thus inducing no negative impact on socio-economic, natural, or cultural environments. Project authorities routinely inspect the structures to identify abnormalities (if any) and remove them through the most suitable repair works.

4.1.2 Positive (Beneficial) Impacts

Socio-economic Environment

With restoration of the breached dam, movement of soil materials will decrease so that sediment damage to lands and infrastructures such as road, bridge, canal, and dam at downstream is reduced. This will significantly contribute in public safety, and longevity of infrastructures, bringing-about socio-economic benefit.

If no dam, sediment is spread by water in the area, and blown up by wind in dry season, creating a dusty atmosphere with polluted air. Dust in the air not only insert negative impact on human health, but also in windy hours will cause reduction in vision of vehicle drivers leading to traffic accident and human causality. In both of the cases man must spend money for recovery and getting back to normal condition.

When wind cease, soil particles suspended in air will settle on vehicles, telecommunication instruments, water conveyance and storage facilities, and other infrastructures in the area, making the maintenance of such commodities difficult and expensive. Malfunctioning of any infrastructure is nuisance to society. It should be noted that the fine particles in air could travel several kilometers by wind, and insert their negative impacts even out of the project area. To avoid/reduce these problems, and decrease their damages to society, restoration of breached dam, through which sediment is control (fixed in place) is much beneficial.

The sediment retained behind the dam will hold large volume of water, contributing to groundwater recharge. With larger volume of groundwater, there will be more water available for sanitary and cultivation purposes, both being beneficial to people in the area.

Natural environment

If dam for sediment control is not established, soil materials will move to downstream and burry seedlings of natural plants and hinder their growth. With sediment control, natural vegetation finds more opportunity for growth and enhancement of natural environment. With establishment/expansion of natural vegetation, infiltration rate of land increases to promote groundwater recharge. With more availability of groundwater, deep-rooted trees will have vigor growth. Vigorous vegetation plays important role in erosion control and sediment retention, resulting in reducing amount of soil loss and lowering rate of land deterioration, contributing to conservation of the environment.

With more availability of water and vegetation, herbivorous animals are attracted to the area, followed by carnivorous predators, to enrich the biodiversity of the area. A natural environment with high biodiversity rate is highly pleasant and appreciable.

With sediment control water quality is not much affected, thus better living condition for fish and other aquatic organism, hence more food for predatory birds feeding on such creatures. Existence of bird will contribute to natural beauty and attraction of nature (birds) lovers to the area.

Cultural environment

By fixing soil materials (sediment), no site/object of historic, cultural, or religious importance is affected at downstream by particles moving with water. Since fine particles in the air (dust) could settle on such site/object, when wind cease, less dust in atmosphere is desirable, and this can be realized through restoration of breached dam and fixation of sediment in place.

4.2 Environmental Impacts of Project with Non-structural Measures

4.2.1 Flood Forecasting, Warning and Evacuating System for Golestan National Park

This project has no significant negative (adverse) impact on socio-economic, natural, or cultural environments. It involves no large construction work, but it largely improves/upgrade

existing systems and utilize them in more efficient manners. Establishment of new instrument/devices is performed with less disturbance of the environment.

Followings are among the positive (beneficial) impacts of the project:

- The project will ensure safety of people and increase their confidence in economic activities, by providing them early and reliable disaster related information. Basing on the timely information people would have time to relocate their movable assets and leave the area before being hit by floods.
- At normal time the project will routinely provide weather information to people through broadcasting media, based on which them may plan own daily activities. When forecast of bad weather people can get ready to leave the area immediately upon announcement of emergency situation.
- With availability of an accurate and efficient forecasting and warning systems, larger number of tourists are encourage to visit the area, contributing to its economic status.

4.2.2 Publication of Flood and Debris Flow Hazard Maps

This project involves no any construction work so that no any negative (adverse) impact can be seen on socio-economic, natural, or cultural environments. Meanwhile it's positive (beneficial) impacts are:

- This project is highly beneficial and efficient in enriching public knowledge on natural disasters at normal condition and saving their lives in disastrous situation. It also matches the efforts of State Corp of Unexpected Events, which disseminate materials to promote public knowledge and understanding on disasters, and prepare them for coping with crises of unexpected events.
- The project is of preparatory, advisory and precautionary type, having no structural measure, aware residents on extent of flood inundation zone, and indicates them proper routes to evacuation, as well and safe places to refuge during disaster (flood) period.
- At normal situation hazard map could be used as a guide for urban development and land use planning, reflecting its multipurpose nature and economic efficiency.
- However the main aim of hazard map is to facilitate evacuation of people through safe routes to safe places for nullifying/minimizing causalities during disaster. At normal time it can also be used for disaster training and educational purposes in order to increase public knowledge on natural disasters, ensure their quick response and enhance their evacuation capability.

It should be noted that the operation/maintenance of those non-structural measures is very simple, with no any negative (adverse) impact on socio-economic, natural, and cultural environments.

4.3 Result of Environmental Evaluation

Each individual project results in direct and indirect impacts. Cumulative impacts are the aggregates of direct and d indirect impacts, which could be negative (adverse) or positive (beneficial). Assessment of cumulative impact is important in judging the environmental soundness of the projects.

Based on impact evaluation discussed above, and considering the opinion of inhabitants of the area, known during the field village surveys and through holding public consultation meeting, it can be mentioned that the priority projects formulated by JICA study team, have some negative (adverse) impacts on socio-economic, natural, and cultural environment. But these impacts are temporary, mostly at construction phase, and reversible. Therefore projects are realized as environmentally sound, socially acceptable, and thus endorsed for execution.

CHAPTER 5 ALTERNATIVES

After careful environmental examination and analysis of social situation, two options, namely without project (no action) and relocation of village threaten by disasters (sediment), were identified as discussable alternatives.

5.1 Without Project (No Action)

Without project the natural, socio-economic, natural, and historical cultural environments are affected as stipulated below:

- With spread of soil particles (sediment) in the area, on dry season particularly at windy hours, there would be more dust in the atmosphere, causing air pollution to affect large number of people in a wider range.
- With time sediment will damage the road, bridge, and other social infrastructures, reducing their service providing capability and creating nuisance situation.
- Sediment is transported by floodwater and deposited in water conveyance facility (canal) and dam reservoirs at downstream, decreasing their capacity, efficiency and lifespan.
- With threat of disasters (sediment deposition), investors find no incentive to invest in business activities in the area, leaving inhabitants under unemployment stress, affecting their health and happiness.
- Sediment will largely spread in the area, reaching to farmland, orchard, livestock, and other economic establishments to damage them and reduce their productivity.
- Sediment spreading on natural lands suppresses growth of natural plants by damaging their seedlings at early growth stage, thus causing reduction in vegetation density.
- Soil particles (sediment) moving by water/wind would settle on site/object of historical, cultural and religious importance to affect their physical appearance or burry them.
- Protecting citizens against disasters and caring for God-gifted natural resources are among tasks (action) of the Islamic government, being opposite to “no action” option.
- Throughout the village survey (using questionnaire) conducted by JICA team during October 2004 to September 2005, the inhabitants clearly requested for execution of projects and expressed their willingness to cooperate in realization of projects in the area.
- In Public Consultation Meeting held on January 30, 2006 in the prime-area of priority projects, people did not support the “no action” option.

Considering the points mentioned above, without project (no action) alternative is irrational and thus discarded.

5.2 Relocation of Village Being Threaten by Flood Disaster

As mentioned earlier Dasht village is directly threatened by flood disasters. In case of relocation option this village must be entirely removed and settled in a safer area, to convince the people that authorities are concerned about their safety and economic activities. While relocation is not a suitable and wised decision to take, due to following reasons:

- Relocation is an expensive, complicated undertaking not involving only technical but also legal, political (administrative), social, environmental, religious and even spiritual (emotional) issues, since deceased persons of the village are buried in its graveyard, where the inhabitants visit weekly (usually Thursday) as a religious norm to pay respect to their beloved relatives being buried therein. With relocation this spiritual (emotional) contact will be disturbed, bringing-about an adverse impact, which could be termed as

spiritual impact of the project. Since it is difficult to grasp and extent/severity of this impact for mitigation, avoiding its occurrence is much wised.

- Large amount of money, particularly after the 2001 Flood has been spent to furnish the village with communication road, educational, sanitary, telephone service and other social infrastructures, to meet the basic human needs.
- After the flood a large and well-architecture mosque (religious site) has been established in the area, serving not only praying purpose, but also used as place for gathering and discussing the village matter, including project issues. Abolishing/destructing religious establishment (mosque) is not acceptable by society and the Islamic doctrine.
- With relocation large amount of money and huge volume of energy is dissipated.
- Land acquisition for establishing new village, involves long legal process for securing the necessary documents and obtaining construction permit. After land acquisition (if realized), construction works would proceed for many years, inserting not only heavy economic burden on society, but also cause significant damages to the environment. Of which generation of noise, smoke, dust, domestic waste, acceleration of soil erosion, and land deterioration are to be pointed out.
- Results of village survey and public consultation meeting indicate that the inhabitants are not agree with relocation option, and determine to demand huge compensation for their land and real estates, if relocation option is negotiated, to kill the idea. It should be noted that arable lands belonging to village are fertile and productivity, being partly irrigated by spring water of good quality.

Relocation due to its social/legal complicity, economic burden and environmental damages is judge as irrational, unacceptable option and thus discarded.

5.3 Decision and Nomination of Alternatives

Ultimately the "with project" option is judged as rational and acceptable for realization. Thus projects formulated by JICA Team are endorses for implementation. The projects are fit to the area, and possessing desirable characteristics such as:

(1) Simple, of small scale, having least adverse impacts on environment, but efficient in reducing the sedimentation and erosion rates

(2) Efficient in preventing human causality and capable of reducing damages to people assets and social infrastructures in disastrous time

(3) Socially acceptable, and generate various benefits to local people, such as protection of farmland/rangeland and contribution in groundwater recharge, which are important for agriculture/livestock activities

(4) Some of local people will get engaged in project works (construction), thereby overcoming unemployment and gaining cash for livelihood

(5) Realization of projects would have technical merit for the area. Because during implementation people will observe the construction machinery/equipment, thereby gain knowledge on construction method and become aware of cooperation spirit required for realizing a project.

(6) With project option is important for enhancing natural environment of the area, because it provide more opportunity to vegetation for growth

(7) Wildlife feeding on natural vegetation, would gain sufficient energy and mood for procreation, attracting the predatory carnivorous animals, to enrich the biodiversity and promote environmental status of the area

(8) With execution of project, site/objects with historic, cultural, and religious importance are protected against disasters (sediment), serving the conservation of culture of the nation

(9) People in the area do not support *without project* (no action) alternative

(10) Since people basically are not happy with *relocation* alternative, negotiating compensation matter, and reaching a reasonable agreement with each individual seems impossible. Moreover prolong negotiation would delay the execution of mitigation works, providing time and opportunity to disastrous agents (sediment, erosion) for worsening the situation and increasing the cost of recovery at action time.

CHAPTER 6 IMPACT MITIGATION

6.1 Mitigation and Precaution for Construction Phase

Since negative impacts of project with structural measures prevail only in construction phase, and upon completion of this phase the impacts are nullified. Mitigation measures/precautions to be followed during the construction phase are provided hereunder.

(1) From environmental point of view, the project is advised to dispose its waste materials in designated "dumping sites", where dumping is legally permitted. For this purpose, project should contact the provincial governments of North Khorasan, Semnan and Golestan to inquire about existing legal dumping sites, and use the most appropriate one, considering distance/time for transport, availability of proper access road, and least disturbance to public. After receiving permission from relevant authorities, waste materials generated in construction sites must be transported there and dumped properly. Piling-up of waste materials may be done throughout working period (day/night), but their transportation is performed only at daytime to cause least disturbance of people and wildlife in the area. Wherever possible, special roads could be constructed for waste transportation purpose.

(2) A concrete receptacle should be constructed below ground surface for depositing used oil and other similar wastes generated by machineries operating in construction sites. Then the materials collected therein are disposed in suitable places in an appropriate manner.

(3) Solid waste generated by employees shall be properly collected, packed and transported to the dumping sites. The liquid waste is collected in septic tanks and then disposed in suitable places in an appropriate manner.

(4) Construction crew is advised to wear mouth/nose mask and earplug in working period for being safeguard against air and noise pollutions.

(5) Construction works should be avoided at windy hours to minimize the air pollution by dust/smoke.

(6) The area should be moistened before starting works to reduce dispersion of dust in the area.

(7) Machinery should be operated having noise generation/vibration within the standard limit, not the aged and polluter ones.

(8) Much material (sand/gravel) should not be removed from riverbed for use in establishment of structures, because this may bring-about changes in hydrology and geomorphology of the area.

(9) Although no site of historical/cultural and/or religious importance is identified in the construction areas, the employees, whenever face any unusual object, should report it to project authorities immediately.

(10) The territory of construction site should be made clear on the ground, and establish signboard in suitable places to discourage the entry of people into the area, because operating machines may harm them.

6.2 Mitigation and Precaution for Operation Phase

In principle, the structures after establishment involves no significant operation work, but need some periodically inspection to make sure they are in good condition. In this connection the following points are advised:

(1) In case of appearance of any crack (even small) in dam structure, repair works should immediately be undertaken to prevent malfunctioning of dams and its facilities, as well as to ensure public about proper operation and efficiency of the erected structures.

(2) In rainy season inspection of structures should be more frequent to grasp any malfunction at its earlier time, and take action for removing the problem.

(3) Some fast growing plants should be planted around the structure sites not only to replace the vegetation destroyed as a result of construction works, but also to improve the overall status of natural environment.

CHAPTER 7 PUBLIC CONSULTATION MEETING

7.1 The Meeting

In accordance with JICA Guidelines for Environmental and Social Considerations, 2004 and in line with international norm for project formulation, and consideration of Islamic doctrine, which encourages consultation/exchange of view in important affairs, the public consultation meeting was held with following particulars:

(1) Title

Public consultation meeting for explanation of IEE on priority projects

(2) Organizers

Counterpart personnel of Golestan and North Khorasan provincial Jihad-e-Agriculture organizations, and JICA team

(3) Venue

Field office of watershed management department of North Khorasan provincial Jihad-e-Agriculture organization, Dasht village

(4) Date/Time

10:00-12:15, January 30 (Monday) 2006

(5) Total Number of Participant

36 persons, comprising of members of Rural Islamic Council, village chief, farmers, livestock breeders, shop keepers and ordinary people of Daht village

(6) Speaker (in order of speaker)

- Mohamadreza PARSAMEHR, head of division for study and technical support, Golestan provincial Jihad-e-Agriculture organization
- Kenji TOYOTA, expert for structural design and cost estimate, JICA team
- Gholamhossein SHOKOHIFARD, expert for Environmental and Social Considerations, JICA team
- Kanehiro MORISHITA, Leader of JICA team

7.2 Sequence of Presentation

(1) Opening Speech by the Counterpart

At the beginning of meeting, Mr. Parsamehr welcomed the participants, briefly explained objective of the meeting, and introduced members of JICA team to the people.

(2) Presentation of the Project Outline

Mr. Toyota explained outline of projects with structural measures through an interpreter. By showing some slides he indicated layout of structural measures proposed in the JICA Master Plan, and as well explained the criteria for selecting priority projects for conducting Feasibility Study on them. He also showed some pictures from sabo works in Japan, and emphasized on efficiency of such structures in watershed management activities.

(3) Presentation of the IEE Results

Mr. Shokohifard presented outcome of IEE conducted on priority projects. Although he showed his slide with English writing, he explained them directly in Persian (Farsi), as a native member of JICA team.

7.3 Summery of Discussion

After the presentation, question and answer session begun, with the question from participants. Since most of the questions and issues raised in the meeting were more or less similar, of which only significant ones are listed below. In parallel, JICA team together with counterparts from Golestan and North Khorasan provincial Jihad-e-Agriculture organizations answered the question and provided more details to participants. They are as briefed below.

Fig. 7.1 Presentation of IEE Results

Fig. 7.2 Participants for the P/C Meeting

Q 1: Past floods imposed economic and psychological damage to people, and now almost every year they have floods. In this context they asked how JICA projects could efficiently protect them against disasters.

A 1: After the 2001 Flood a polder dike has been constructed to protect the village against floods, it is a good structure and for the time being it will serve the purpose.

Q 2: Realization of long term and important projects proposed by JICA team will take about 25 years, while they are frequently threatened by disasters. Therefore they requested for early implementation of such projects, which guaranteed their safety.

A 2: The target year for the projects is 2025, and the villagers consider it too long period. Therefore besides large and long term projects, the team also proposed some urgent ones among the entire projects to immediately increase the safety of people against floods.

Q 3: JICA team explained construction of a small dam for sediment control, but the villagers think a relatively larger multipurpose (sediment control and water storage) dam is more beneficial to the village.

A 3: The villagers requested to have big and strong (concrete) structures, but formulation of any project involves technical/engineering, economic/financial, and environmental aspects. It means project from technical, economic and environmental viewpoints must be evaluated, if judged rational, for the endorsement of implementation. In addition, JICA team also considers large dam planning at the mouth of gorge in the Gelman Darreh River.

Q 4: They are mostly farmers, depending on arable lands for livelihood. Construction of structures can affect some parts of their agricultural lands. The project shall consider

proper compensation for the affected lands. Structural design (canal, dam) with least impact on agricultural lands is more appreciated.

A 4: At the time of implementation, if the project affects the agricultural lands, the proponents certainly will negotiate compensation matter with the villagers to reach an agreement.

Q 5: The dam in Ghiz Ghaleh sub-basin, which was breached by the 2001 Flood, was an earth dam, means earth dam is not suitable for such a susceptible site. Thus they request to construct a concrete dam with proper spillway, rather than an earth dam.

A 5: The team explained the hydrological study process under JICA team activities. Spillway of the breached dam was designed on the basis of unreliable rainfall. But hydrological designing process was already improved so that the design discharge will be computed much more reasonably and reliably. As a result, even though the earth dam type is selected for rehabilitation, the dam shall be equipped with the proper spillway.

Q 6: In designing canal or any other water diversion/conveyance facilities, careful attention shall be paid to distribution of our agricultural lands, because they expect least disturbance of their land and farming activities by the projects.

A 6: Final design of proposed canal/water conveyance facilities depends on realization of projects formulated by Iranian sides. If they implement those projects, then our design should be reviewed and updated to mach the situation.

7.4 Results of the Meeting

After the meeting, JICA team and counterparts from Golestan and North Khorasan provincial Jihad-e-Agriculture organizations, had a small meeting to extract the essence of the public consultation meeting. After some discussion they collectively agreed on following points:

- In general, people in the area are interested in the JICA projects and wish for their early realization.
- However some of them are anxious about fate of agricultural land, which could be affected as a consequence of construction of structures, but disagree with no action and relocation of village alternatives.
- They recognized the importance of projects of flood warning and hazard map for evacuation during the disaster, as well as their merit in normal time.
- Project for stabilization of riverbank was attractive to them, since further expansion of gully may lead to land deterioration.
- They suggested construction of large reservoir dam, because they like to have irrigated agriculture, and thereby more income.
- They understood the negative (adverse) and positive (beneficial) impacts of the projects, and felt with project alternative is rational.

CHAPTER 8 CONCLUSION AND RECOMMENDATIONS

8.1 Conclusion

Based on above mentioned explanation and discussions and referring to available document and evidences, it is concluded that none of the projects formulated by JICA team require further full-scale EIA. Thus they are endorsed for implementation, with condition that the proponent/executors pay attention to following recommendations and fully observe them. This conclusion is in line with environmental guidelines published by DOE, as well as guidelines of JICA, which state projects with environmental category B, and of watershed management nature are considered as environment-friendly, thus requiring no EIA.

With project alternative was realized much environmentally sound and socially acceptable, as compared to without project (no action), and relocation of village, thus endorsed for execution.

Iran is included in world's 10-top disastrous countries, as 70% of the country is prone to earthquake, and 50% to floods. In total 90% of population is subjected to cumulative disasters of natural events (earthquake and floods), making the statesmen unable/unsuccessful in disaster management task. Furthermore in this fragile circumstance the status/responsibility of people in disaster management/mitigation is not defined. Therefore systematic and realistic disaster management/mitigation approaches need to be established, involving coordination of state agencies and participation of local people. The caption project could pave foundation for such activities, and serve as a road map to conservation and enhancement of socio-economic, natural, and cultural environments in the country over a long time period.

8.2 Recommendations

(1) Knowledgeable and experienced environmental specialists shall be involved in all activities of the projects to receive their suggestion and advices as activities in consistency with environmental management and monitoring.

(2) In case of any abnormality, the contractors and villagers shall immediately inform the relevant organization/institutes and seek their advice and assist in solving the problem. Relevant institutions are:

- Ministry of Jihad-e-Agriculture and/or its General Directorate in Golestan, Khorasan and Semnan Provinces
- Department of the Environment and/or its General Directorate in Golestan, Khorasan and Semnan Provinces
- Cultural Heritage and Tourism Organization and/or its General Directorate in Golestan, Khorasan and Semnan Provinces
- Natural Resources General Office in Golestan, Khorasan and Semnan Provinces
- Ministry of Energy and/or its Regional Water Board in Golestan, Khorasan and Semnan Provinces

(3) Participation of local people, collaboration of governmental agencies and provincial governments shall be encouraged for realizing the project.

(4) The local people shall be engaged in construction works as much as possible, to create job in the area, and thereby gain continuous public support for the project.

(5) According to regulation of Cultural Heritage and Tourism Organization, any construction activity/material must be at least 50 m away from site of cultural, historical and religious importance. Project is strongly recommended to follow this instruction, as well quickly contact the nearest of the organization, whenever face any strange object.

APPENDIX

Scope of Work

Minutes of Meetings

SCOPE OF WORK
FOR
THE STUDY
ON
Flood and Debris Flow in the Caspian Coastal Area Focusing on the flood-hit Region in Golestan Province

AGREED UPON BETWEEN

Ministry of Jihad-e Agriculture

AND

Japan International Cooperation Agency

Tehran, September 3, 2003

Forood Sharifi

Dr. Forood Sharifi
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原 義文

Mr. Hara Yoshifumi
Leader of the Preparatory Study Team
Japan International Cooperation
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Ⅰ. INTRODUCTION

In response to the official request of the Government of the Islamic Republic of Iran (hereinafter referred to as "Government of Iran"), the Government of Japan decided to conduct the Study on Flood and Debris Flow in the Caspian Coastal Area Focusing on the flood-hit Region in Golestan Province (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.
Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of the Government of Iran.

The present document sets forth the Scope of Work with regard to the Study and will be valid after exchanging Verbal Notes between Government of Iran and Government of Japan concerning implementation of the Study.

Ⅱ. OBJECTIVES OF THE STUDY

The objectives of the Study are:
1. To formulate a master plan up to the target year 2025 for prevention of flood and debris flow disaster in the Madarsoo River Basin,
2. To create a manual for planning and designing of flood and debris flow countermeasures, and
3. To pursue technology transfer to counterpart personnel in the course of the Study.

Ⅲ. STUDY AREA

The Study will cover Caspian Coastal Area, mainly focused on the Madarsoo river basin.

Ⅳ. SCOPE OF THE STUDY

In order to achieve the objectives mentioned above, the Study will cover the following items:

Phase I: Basic Study and Analysis for formulation of master plan

1. Collection and analysis of existing information (documents, materials, and data)
   a. natural conditions (topography, geology, meteorology, etc.)
   b. national and regional socio-economic conditions, financial conditions
   c. river and slope condition
   d. existing facilities and measures related to flood and debris flow control including emergency works plan for the fast track implementation (dam, sabo dam, shore protection, etc.)
   e. infrastructure (road, bridge, etc.)
   f. relevant legislation/ organizations/ institution
   g. present watershed management, etc.

2. Review of foregoing, ongoing and prospective plans, studies and projects

3. Field survey
   1) Madarsoo River Basin
   2) Flood and Debris flow hit area
   3)Other Caspian Coastal Area(two or three rivers)

4. Socio-cultural survey(Madarsoo River Basin)
   a. population
   b. settlement and community
   c. property
   d. life-style
   e. industry
   f. public education
   g. awareness of flood and debris flow prevention
   h. awareness of law or regulation

5. Analysis
   a. hydrological analysis
   b. sediment loads analysis
   c. debris flow analysis
   d. flood run-off analysis
   e. inundation analysis
   f. damage analysis
   g. flood root causes analysis

6. Evaluation of facilities for disaster prevention of flood and debris flow
   a. allocation
   b. location
   c. type
   d. scale
   e. materials

7. Socio economical prediction

<u>Phase II: Formulation of Master Plan</u>

<Countermeasure for Debris flow>

1. Criteria for site selection of structural measure for debris flow
   a. area
   b. population
   c. property
   d. effectiveness of structural measure
   e. geographical and soil condition
   f. hydrological condition, etc.

2. Site Selection of structural measure

3. Alternative analysis

4. Environmental Impact Analysis, Social Impact Analysis

5. Design and Cost estimation

6. Non structural measure (warning and evacuation)

<Countermeasure for Flood>

1. Plan of River Scale

2. Structural measure for planned flow

3. Alternative analysis

4. Environmental Impact Analysis, Social Impact Analysis

5. Design and Cost estimation

6. Non structural measure (warning and evacuation)

<Combination>

1. Organizational and Institutional Plan
   a. implementation organization
   b. demarcation of responsibilities among the relevant authorities
   d. regulatory and institutional arrangements
   e. enforcement of law and regulations

2. Capacity Development Plan
   a. capacity building of the organizations concerned
   b. human resource arrangement and development
   c. training plan of the staff of the organizations concerned

3. Education and Extension Plan of Local People
   a. education plan of the local community and people
   b. enlightenment plan of the local people and visitors
   c. plan of disaster prevention drill for the local communities and people

4. Implementation Plan
   a. implementation schedule
   b. budget allocation
   c. monitoring and evaluation plan of the implementation

5. Evaluation
   a. Financial and economic analysis
   b. Technical evaluation
   c. Social impact evaluation and
   d. Environmental impact assessment

<u>Other activities</u>

1. Pilot project
   a. debris flow disaster warning and evacuation, etc.

2. Manual Creation

a. study plan
b. criteria for site and facility type selection
c. design and calculation

3. Technology Transfer Seminar

4. Public Hearing

5. Publication of Newsletter of the Study

6. Setting up of web-site

V. SCHEDULE OF THE STUDY

The Study will be carried out in accordance with the tentative schedule as attached in the annex. The schedule is tentative and subject to be modified when both parties agree upon any necessity that will arise during the course of the Study.

VI. REPORTS

JICA will prepare and submit the following reports in English to Iran.

1. Inception Report:
Twenty (20) English copies at the commencement of the first field work in Iran

2. Progress Report:
Twenty (20) English copies at the end of the first field work in Iran

3. Interim Report:
Twenty (20) English copies at the commencement of Phase II study

4. Draft Final Report:
Twenty (20) English copies at the end of Phase II study
Iran side shall submit its comments within one (1) month after the receipt of the Draft Final Report.

5. Manual
Twenty (20) English copies at the end of Phase II study

6. Final Report:
Final Report will consist of Executive Summary, Main Report, Supporting Report, and/or Data Book. Twenty (20) English copies will be submitted within one (1) month after the receipt of the comments on the Draft Final Report.

Ⅶ. UNDERTAKINGS OF THE GOVERNMENT OF IRAN

1. To facilitate the smooth conduct of the Study, the Government of Iran shall take the following necessary measures:

(1) To permit the members of the Team to enter, leave and sojourn in Iran for the duration of their assignments therein and exempt them from foreign registration requirements and consular fees;

(2) To exempt the members of the Japanese study team (hereinafter referred to as "the Team") from taxes, duties, and any other charges on equipment, machinery and other materials brought into Iran for the implementation of the Study;

(3) To exempt the members of the Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Team for their services in connection with the implementation of the Study; and

(4) To provide necessary facilities to the Team for remittance as well as utilization of the funds introduced into Iran from Japan in connection with the implementation of the Study.

2. The Government of Iran shall bear claims, if any, against a member(s) of the Team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the member of the Team.

3. Ministry of Jihad-e Agriculture shall act as a counterpart agency to the Team and also as a coordinating body in relation with other governmental and non-governmental organizations for the smooth implementation of the Study.

4. Ministry of Jihad-e Agriculture shall, at its own expense, provide the Team with the following, in cooperation with other organizations concerned:

(1) Security-related information as well as measures to ensure the safety of the Team;
(2) Information on as well as support in obtaining medical service;
(3) Available data and information related to the Study;
(4) Counterpart personnel;
(5) Suitable office space with necessary office equipment (telephone etc.) and furniture;
(6) Credentials or identification cards; and
(7) Appropriate numbers of vehicles with drivers.

Ⅷ. CONSULTATION

JICA and Ministry of Jihad-e Agriculture shall consult with each other in respect of any matter that may arise from or in connection with the Study.

Annex I

Tentative Schedule

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Work																								
Phase																								
Report	IC/R		P/R(1)						P/R(2)					IT/R					DF/R			F/R		
Seminar / Workshop								▲					▲							▲				

IC/R: Inception Report, P/R: Progress Report, IT/R: Interim Report,
DF/R: Draft Final Report, F/R: Final Report

MINUTES OF MEETINGS

on

the SCOPE OF WORK

for

THE STUDY

on

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Mr. Hara Yoshifumi
Leader of the Preparatory Study Team
Japan International Cooperation
Agency (JICA)

In response to the official request of the Government of Islamic Republic of Iran (hereinafter referred to as "the Government of Iran"), the Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the preparatory study team (hereinafter referred to as "the Team"), headed by Mr. Hara Yoshifumi, to Iran from August 25 to September 3, 2003 to discuss the Scope of Work (hereinafter referred to as "S/W") for the Study on Flood and Debris Flow in the Caspian Coastal Area Focusing on the flood-hit Region in Golestan Province (hereinafter referred to as "the Study").

During the period of the preparatory study, the Government of Iran and the Team held a series of meetings and conducted field survey. The list of those who attended these meetings is shown in the Annex.

As a result of the discussions, Ministry of Jihad-e-Agriculture (hereinafter referred to as "MOJA"), which is the counterpart organization, and the Team came to an agreement on S/W which was signed on September 3, 2003.

The Minutes of Meetings have been prepared for the better understanding of the S/W. Both sides (MOJA and the Team) agreed and confirmed the following points for the smooth implementation of the Study.

Implementation Framework for the Study

1. Establishment of Committees

Considering the importance of cooperation among the relevant Iranian organizations and involvement of them in the Study, both sides agreed that the MOJA would establish two committees: Steering Committee and Technical Committee, before starting of the Study. These two committees shall undertake the following responsibilities, respectively.

(1) Steering Committee (ST/C)

The Steering Committee (ST/C) should guide the Study to the proper direction as a national level committee, covering various aspects on debris and flood disaster prevention and control. The ST/C should be chaired by Deputy for Watershed Management, Forest, Range and Watershed Management Organization, Ministry of Jihad-e-Agriculture. In principle, the ST/C should be held around three times a year and when MOJA and/or the Japanese side request.

The ST/C would be composed of representatives of the following organizations:

- Ministry of Jihad-e-Agriculture
- Ministry of Energy

- Ministry of Interior (including from Provincial Governments)
- Ministry of Road and Transportation
- Ministry of Foreign Affaires
- Department of the Environment
- Management and Planning Organization
- Other related organizations

(2) Technical Committee (T/C)

The Technical Committee (T/C) should be organized under the ST/C to provide the JICA study team of the Study (hereinafter referred as to "the Study Team") with instructions and/or information relating to the Study and advice on appropriate technologies to be applied in the Study. The T/C should be chaired by General Director of Study and Evaluation Department, Ministry of Jihad-e-Agriculture. In principle, the T/C should be held around once per two months and when MOJA and/or the Study Team request.

The T/C would be composed of the following members:

- Representatives of related sections of Ministry of Jihad-e-Agriculture
- Representatives of related sections of Ministry of Energy
- Representatives of related Provincial Authorities
- Representatives of related research institutes and universities

2. Counterpart Organization

Both sides agreed that MOJA should act as the counterpart organization to the Study Team and also as the coordination body to obtain close cooperation from the relevant organizations, especially Ministry of Energy, throughout the Study, since the Study would include various fields relating to the other organizations.

3. Counterpart Personnel

The Team requested and MOJA agreed to assign counterpart personnel to each expert of the Study Team and to submit the list of them by the end of November. In order to assign each counterpart personnel, the Team agreed to inform the number and field of experts when decided.

Contents of the Study

4. Countermeasures

Both sides agreed that short term and long term countermeasures would be considered in the Study and biological measures such as forestation and range management would be studied briefly as one of long term countermeasures by reviewing the existing plan and information to

be provided by the Iranian side.

5. Manual Creation

Both sides agreed that the manual shall be composed of planning for non-structural and structural measures, and designing for structural measures.

6. Study Area

Both sides agreed that concrete countermeasures would be proposed to the Madarsoo River Basin, which catchments area is approximately 2,300 sq km, while an overview of the situations based on data and information to be provided by the Iranian side would be carried out for the other Caspian coastal areas in order to create the above mentioned manual appropriately.

7. Urgent Measures

MOJA explained that MOJA had obtained necessary budget of the fiscal year 2003 to conduct urgent measures against debris flow and flood at the Madarsoo River Basin, and requested supports such as detailed design of the structural measures.

The Team answered that there was a possibility Study Team could provide technical advice during the Study if the schedule permits and the design and its implementation will be conducted under the Iranian side's responsibility. The team also promised to convey this request to JICA Headquarters.

8. Simulation

MOJA requested that the Study Team should clarify effects of projects, which will be proposed by the Study, by using a simulation model in order to explain the effects to inhabitants, NGOs, and central and local governments.

The Team answered that type of the simulation model as well as criteria and indicator to be adopted in the Study should be determined between the MOJA and the Study Team in the course of the Study because these matters depended on availability of data and projects to be proposed.

9. Manner of Analysis

MOJA asked that what kind of methodologies would be used for each analysis described on Scope of Work and what criteria would be used for the alternative analysis. MOJA also requested JICA to consider flood routing in the alternative analysis.

The Team answered that the methodologies and criteria to be adopted in the Study mainly depended on availability of data and they would be decided in the course of the Study. The

Team also explained that the idea, criteria and procedures to reach the conclusion would be described in the manual so that the results of the Study could be adapt to other Caspian coastal areas by the Iranian side, and flood routing should be considered in the Study.

10. Pilot Activity

The Iranian side asked that what would be the contents of pilot activity and what kind of instruments would be used for the pilot activity. The Team answered that the pilot activity would be a local debris flow forecasting and warning system and kind of instrument to be used would be informed at the commencement of the Study or during the Study. The Team also answered that one or two rainfall gauges with alarm would be considered for the pilot activity as a temporary idea, and result of pilot activities should be reflected on the master plan.

11. Counterpart Training in Japan

MOJA requested that Iranian counterpart personnel take advantage of training in Japan related to the Study to promote an effective technology Transfer.

The Team promised to convey this request to JICA Headquarters.

12. Workshop and Seminar for Technology Transfer

The Iranian side requested that the Study Team should provide training to staff of MOJA. The Team understood importance of training and proposed that workshops would be held during the Study as part of technology transfer. The workshops would include lecture, field training, practice and presentation regarding debris flow and flood prevention and control.

13. Evaluation of Implementation

MOJA requested to include evaluation of the implementation of projects to be proposed by the Study. The Team answered that the evaluation methods should be proposed based on the discussions between MOJA and the Study Team during the Study.

14. Public Hearing

MOJA asked the meaning about the "Public hearing" described on Scope of Work. The Team answered that there were two meanings in it. One was to give enough information of the Study to the local people and visitor in the Study area (Madarsoo River Basin), and the other was to hear opinions of them.

15. Report

MOJA agreed that all of the report of the Study would be open to the general public.

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MOJA requested that JICA prepared the Final Report, manual, materials for workshop and so on in Persian as well as in English to make effective technology transfer to staff of Government of Iran.

The Team promised to convey this request to JICA Headquarters.

Undertakings of the Iranian Side

16. Vehicle

MOJA promised to provide one 4WD vehicle, which was transferred to MOJA after the study of watershed management for Karoon river, to the Study Team.

17. Office Space

MOJA promised to provide the Study Team with enough office spaces for the member of the Study Team both in Tehran and Gorgan.

18. Data and Information

MOJA promised that necessary data and information, which MOJA had such as maps, GIS data, satellite images, aerial photographs, hydrological and meteorological so on, should be provided to Study Team.

ANNEX

LIST OF PARTICIPANTS

Iranian Side:

Forest, Range and Watershed Management Organization (FRWO), Ministry of Jihad-e-Agriculture (MOJA)

Dr. Forood Sharifi	Watershed Management Deputy (WMD)
Mr.Reza Sohrabi	Director General of Study & Evaluation Department, WMD
Mr.Ali Chananeh	Director General of Planning and Coordination Department, WMD
Mr.S.A.Mirghasemi	Vice Director of Planning and Coordination Department, WMD
Mr.Nader Senoubar	Director General of Watershed Executive Affairs Department, WMD
Mr.Hamid Reza Zakizadeh	Chief of Land Evaluation Group, Study & Evaluation Department, WMD
Mr.Ali Akbar Mooshivand	Chief of Flood Group, Study & Evaluation Department, WMD
Mr.M.R.Shojaei	Director of General of Planning and Coordination Department, WMD
Mr.Mohamnad Sabouri	Senior Expert of WMD
Mr.Behbahani	Senior Expert of WMD
Mr.R.Roshani	Expert of WMD
Mr.Abolghasem Zinali	Vice Director of Planning and Coordination Department, WMD
Mr.Eskanderi	Director of General of Range Department, Range Management Deputy (RMD)
Mr.Parvis Salehi	Expert of Forest, Forestry Affairs Deputy (FAD)
Mr.Moeteza Ebrahimi	Expert of Forest, FAD
Mr.Javad Mojtahed	Expert of Horticulture Deputy
Mr.Jahangir Arab	Team Manager of Golestan Project, Horticulture Deputy

International and Regional Organizations, Ministry of Jihad-e-Agriculture (MOJA)

Mr.M.R.Shariaty	Vice Director General for International and Regional Organizations

Golestan Provincial Office, Ministry of Jihad-e-Agriculture (MOJA)

Mr.Jamshid Gafari	Vice Head of Provincial Jihad-e- Agriculture Organization
Mr.Kambiz Alipoor	Chief of Evaluation and GIS Office
Mr.Ali Salmany	Chief of Study Management
Mr.Rojabaliz Salmani	Chief of Study Management
Mr.Reza Ahmadi	Expert of Watershed Management Office
Mr.Mohammad Reza Montazerion	Expert of Watershed Management Office

Mr.Mohammad Reza Parsamshr	Expert of Watershed Management Office

Ministry of Foreign Affairs (MOFA)

Mr.Hojat Moghadam

Management Planning Organization (MPO)

Mr.Adl Hamid Reza	Senior Expert of Agriculture and Natural Resource Department
Mr.Hosseinpoer Hamid	Expert of Agriculture and Natural Resource Department

Ministry of Energy (MOE)

Mr.Jabar Vatan Fada	Director General of River and Coastal Engineering Department

Ministry of Interior (MOI)

Mr.Jazaieri	Director General of Natural Disaster Prevention Department

Golestan Provincial Office, Ministry of Roads and Transportation,

Mr.Ali Lotfi	Director General of Road and Transportation

Government Office of Semnan Province

Mr.Hasan Akbarpoor	Director General of Planning of Natural Resources
Mr.Hooshang Heidari	Deputy of Planning of Natural Resources
Mr.Hamid Nasiri	Expert of Planning of Natural Resources

JICA Experts

Mr.Takayuki Nagai	Expert on Watershed Management, MOJA
Mr.Seigo Furudono	Expert on Agricultural Development, MOJA

Japanese Side:

Preparatory Study Team (Team)

Mr.Yoshifumi Hara	Leader, Disaster Prevention Planning
Mr.Tomoyuki Okada	Member, Countermeasure for Flood
Mr.Hideaki Matsumoto	Member, Study Planning / Preparatory Evaluation
Mr.Yukishi Tomida	Member, Disaster Prevention Operation
Mr.Toshiyuki Ujiie	Member, Environment and Social Impact Assessment / Organizational Analysis

Embassy of Japan

Mr.Tomomasa Onomi	Second Secretary

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